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HANDBOOK
OF THE
6-INCH Q.F. GUN.
LAND SERVICE.
1903.

(War. pamphlet 3.125)
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HANDBOOK

OF THE

6-INCH Q.F. GUN



LAND SERVICE.



1903.



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[NOTE.—This Handbook has been corrected up to May, 1903. Any alterations which may be suggested should be forwarded to Chief Inspector, Royal Arsenal, Woolwich.]

HANDBOOK

OF THE

6-INCH B. Q.F. GUN.

LAND SERVICE.

ORDNANCE, Q.F. 6-INCH, B, MARK II.

(Plate I.)

PUBLIC LIBRARY OF VICTORIA	Material	.. .. .	..	steel (wire construction).
	Weight	{	of gun without fittings	6 tons 7 cwt. 3 qrs.
			of breech fittings	4 cwt. 3 lb.
	Length, total	.. .. .	..	249.25 inches = 41.54 cal.
	Bore	{	calibre	6 inches.
			length (to face of breech screw)	240 inches.
			system	Polygroove, hook section.
	Rifling Mark I.	{	length	214.7 inches.
			twist	{ Increasing from 1 turn in 60 calibres at breech end of rifling to 1 turn in 30 calibres at muzzle.
		{	number	
			depth	
			width	
	*Rifling Mark II.	{	system	Polygroove, modified plain section.
			length	214.7 inches.
		{	twist	{ Straight from breech end of rifling to 178.7 inches from the muzzle, then increasing from 0 to 1 turn in 30 calibres at muzzle.
			number	
			depth	
	Firing mechanism	{	width	24.
			.. .. .	.05 inch.
	Ballastic effects	{	.. .. .	.39 "
			.. .. .	electric and percussion.
	.. .. .	{	.. .. .	see range table.
		

The gun is without trunnions and is made entirely of steel. It consists principally of an A, 1B, and 2B tubes, B hoop, jacket, breech bush and breech ring, and a number of lengths of flat steel wire worked round the 1B tube.

Over the A tube is shrunk the 1B tube, which is secured longitudinally by corresponding shoulders, and a screwed steel breech bush at the rear; the bush is also prepared for the reception of the breech screw. Round the 1B tube are wound successive layers of flat steel wire, the ends of which are secured to steel rings provided

* For guns of future manufacture, also when "through lined," or re-tubed.

for that purpose. The B hoop and 2B tube are shrunk round the A tube in front of the 1B tube extending to the muzzle, the B hoop overlapping portions of the wire and 1B tube. The jacket is fitted over the wire, B hoop, and a portion of the 2B tube, and is secured longitudinally by corresponding shoulders on the B hoop and 2B tube, and by the breech ring, which is shrunk round a portion of the breech bush and screwed to the jacket at the rear.

The breech ring is furnished with a lug on the underside for the attachment of the gun to the hydraulic buffer of the mounting.

Projections are formed on the upper side of the breech ring for the attachment of the gun to naval mountings, but these will not be used when the gun is mounted on land service mountings.

The exterior of the jacket is furnished with longitudinal projections, forming guides for the gun when in the cradle of the mounting.

The chamber is slightly coned so as to facilitate the insertion and extraction of the cartridge, the latter is contained in a brass case.

A plane for a clinometer is formed on the upper side of the gun immediately in front of the guide.

Axis lines are now cut on the muzzle face of the gun, over the A and B tubes, instead of on the B tube only as formerly.

The following is a description of the mechanisms of the gun:—

Breech Mechanism.

(Plate II.)

Screw.—The breech is closed by a steel screw tapering at the front portion, to admit of its being swung into the loading position, the remaining portion being parallel.

The parallel and conical parts of the breech screw have three portions of the thread removed longitudinally, the divisions in relief on the conical portion being placed opposite the plain portions of the parallel part, for the purpose of distributing the strain. The breech opening of the gun being prepared in a corresponding manner admits of the screw, when the raised portions are placed opposite the smooth surfaces in the gun, being swung home and locked by the sixth of a turn. The hole in the firing hole bush is of sufficient diameter (0.25-inch, maximum), to prevent contact, and consequent short circuiting.

To prevent wear to the outer face of the breech screw a hard steel piece is fitted into it, round the recess for the retaining catch, and secured by two screws. And to prevent injury to the screw threads of the breech screw and breech opening, by the rapid and frequent closing of the breech, the edges are now rounded off.

Carrier.—The breech screw is supported, when withdrawn from the gun, by a bronze carrier, hinged to the right side of the breech ring, a projecting arm of which enters an axial recess in the screw. The screw is retained on the carrier, by means of a fixing screw, the inner end of which engages with a recess in the carrier, so arranged as to admit of the screw being turned circumferentially in opening or closing the breech.

Marks I* and II carriers in which the old pattern "bracket catch retaining breech screw" has become loose (owing to wear) should be properly secured.

New carriers fitted with the Mark II catch retaining breech screw, page 5, are stamped Mark III, and older marks of carriers, as they become unserviceable, are also fitted with the Mark II catch, when passing through the Ordnance Factories for repair, and a star (*) is then added to the existing numeral.

To prevent wear to the carrier a hard steel piece is fitted to the recess for the reception of the inner end of the fixing screw of the breech screw, and secured by two screwed rivets; but a certain number of guns have been repaired by the insertion of a hard steel piece at the lower end of the recess in the carrier and secured by three fixing screws, when necessary this steel piece is removed, and the hard steel piece first mentioned inserted, the space left by the removal of the old steel piece being filled in with a bronze filling piece. In order to prevent burring of the threads of the breech screw, and breech opening, when working the breech, the front face of the carrier is now recessed so as to clear the breech face of the gun.

Guns in which the hinge joint of the breech ring and carrier have become worn so as to cause difficulty in opening or closing the breech, will be repaired by the insertion of steel bushes secured by set screws in the lugs of the hinge joint on the breech ring; and of a bronze washer under the hinge joint of the carrier, so as to restore the latter to its original position.

Lever.—Hinged to the carrier is a breech mechanism lever, which is connected by a link to a sliding block in the carrier. The block is furnished with a bronze bush, which engages with a stud in the outer face of the breech screw, so arranged that when the breech mechanism lever is pulled to the right, the first movement of the lever unlocks the breech screw, and on continuing the motion, the screw and carrier are swung into the loading position.

Catch.—A catch, fitted to the carrier, engages with a corresponding recess in the outer face of the breech screw, when the breech is open, and retains the screw in the unlocked position. The catch is automatically disengaged from the screw in closing the breech. A modified form of catch is now provided (catch, retaining breech screw, Mark II) with Mark III carrier, or older marks purposely altered (*see* carrier, page 4); this Mark II catch differs from Mark I in being of a strengthened form, pivoted in a bracket (which is also of a strengthened pattern) attached to the outer end of the carrier, the bracket being secured to the carrier by dovetail projections and by fixing screws, which are prevented from turning when in position by means of locking plates.

Extractor.—The extractor consists of a steel bolt (projecting through the side of the gun into the chamber at the rear) having a shoulder near the inner end to accommodate the head of the cartridge. The bolt is retained in position by means of a nut screwed into the exterior of the gun on the right side, the end of the hole on the left side (to facilitate the removal of the bolt) being closed with a screwed plug. The bolt is worked automatically by a lever fitted to its outer end, and an actuating bolt with spiral spring and cover which engage with an eccentric formed on the hinge of the carrier in such a manner that when the screw is swung into the loading position, the bolt is partially revolved, thereby releasing the cartridge. The extractor bolt is returned into the loading position by means of the spiral spring on the actuating bolt, while the breech is being closed.

Shot Guide.—A bronze shot guide, to facilitate loading, is hinged to the right side of the breech, and is automatically raised to the loading position by means of an inclined plane, on the under side of the carrier, when the breech is opened. A stop screw provided on the under side of the breech opening engages with a groove on the inner side of the guide, and serves to support it laterally.

Firing Mechanism.

The firing mechanism is so arranged as to prevent the gun being fired before the breech screw is locked in the gun and the breech mechanism lever home; that is, until this has been done the striker does not make contact with the electric primer in the cartridge.

A striker, Plate II, for firing the gun by means of an electric current or by percussion, is fitted through the projecting arm of the carrier and retained in position by means of a steel retaining nut provided on the exterior with interrupted thrust collars for that purpose, and a trigger for percussion firing. The retaining nut is secured on the sheath by a bronze or bull metal nut screwed on in rear of the steel head.

The interior of the carrier being prepared to take the striker, admits of the latter being placed in the carrier and locked by one-fourth of a turn of the retaining nut to the right or left, thus rendering the trigger reversible, and admitting of the gun being fired by percussion from either side; when the recess for striker has become worn, it will be repaired by the insertion of a through bronze bush, which is prepared for the striker. The striker, which is actuated by a mainspring, is furnished with an insulated steel needle having an insulating leather washer under its head and another smaller washer at the opposite end of the needle (between the sheath and the two small securing and check nuts). The front end of the needle projects through the firing hole of the breech screw, and makes contact with the primer of the cartridge. The amount of protrusion of the Marks I* (which is the Mark I altered) and II needles through the firing hole must not exceed $\frac{1}{16}$ inch, and is adjusted by a leather washer which is fitted under the head of the needle (in addition to the original insulating washer). With the Mark III needle, firing pins, "short" and "long," are provided, the former is issued in the needle for use, but in cases where the protrusion of the firing pin through the firing hole of the breech screw (owing to wear of the mechanism) is less than $\frac{1}{16}$ of an inch, the latter (which is $\frac{1}{32}$ inch longer) will be used. The outer end of the needle is connected by means of a contact and insulated cable with a contact on the mounting (which see for electric firing).

NOTE.—Mark IV is the latest manufacture of needle; it is fitted with an insulator of vulcanized fibre round the front end, so as to prevent electrical contact between the needle and breech screw. The before-mentioned Marks I*, II, and III needles when fitted with this insulator are stamped Marks I**, II*, and III* respectively.

For the purposes of percussion firing, the Mark I striker is furnished with a cocking-handle, by means of which it is pulled into the cocked position, and retained by the trigger, which engages with a cock-notch, on the outer sheath of the striker. The cocking-handle also serves as a wrench for dismantling the striker. In the case of Marks I* and II strikers the cross-handle of the cable retaining nut serves as a cocking-handle.

A safety stop is provided on the carrier to prevent the gun being fired before the screw is locked, and the breech mechanism lever home. It consists of a spindle, in two parts, with fixing screw. The upper part is provided with a projection, which engages with a lug on the striker, and so prevents contact being made by the needle with the primer in the cartridge. The lower part is furnished with a turning lever, which engages with a cam groove on the breech mechanism lever, in such a manner that in closing the breech the

spindle is partially revolved, and the projection on the upper parts released from the lug of the striker, leaving the latter free to make contact with the primer of the cartridge.

A flat spring fitted to the underside of the carrier engages with a corresponding recess in the breech mechanism lever, and prevents any movement of the latter during firing.

A hook of bull metal for supporting the "A" cable is secured to the carrier by a screw.

REMOVING AND REPLACING THE BREECH FITTINGS.

Before removing the fittings, the breech should be opened, the breech screw being swung into the loading position.

Striker.—Pull back the striker until the projection on it is clear of the recess in the retaining nut, turn the nut one-fourth of a turn to the right or left; the striker can then be withdrawn.

Hook, Supporting Cable.—Remove the securing screw and the hook is released.

Breech Screw.—Unscrew the fixing screw in the breech screw and remove it; the breech screw can then be withdrawn from the carrier.

Safety Stop.—Unscrew the fixing screw from the upper side of the stop, and remove the upper portion; the lower part can be withdrawn from below.

Catch, Retaining, Breech Screw.—Take out the four fixing screws, and remove the bracket with catch. Unscrew the guide screw clear of the catch; the latter, with spiral spring, can then be removed from the bracket.

Sliding Block with Bush.—Take out the fixing screw of the axis pin of the "link sliding block," and remove the axis pin; the sliding block and bush can then be withdrawn from the carrier.

Link, Sliding Block.—Remove the keep pin and nut of the link from the underside of the breech mechanism lever; the link can then be withdrawn.

Lever, Breech Mechanism.—Remove the keep pin and nut from the axis pin; the lever can then be withdrawn.

Spring Retaining Breech Mechanism Lever.—Take out the three fixing screws and remove the spring.

Shot Guide.—Withdraw the keep pin of the hinge bolt, and remove the bolt and washer; the shot guide can then be withdrawn. The stop screw can be unscrewed and withdrawn, but this should only be taken out when absolutely necessary.

Carrier.—Withdraw the keep pin, and remove the hinge bolt; the carrier can then be withdrawn.

Extractor.—Withdraw the keep pin of the axis pin of the actuating bolt, and remove the axis pin with washer. Turn the actuating lever to the right, remove the keep pin, and withdraw the lever from the extractor bolt. Take out the retaining nut of the extractor bolt from the right side of the gun, and the screw plug from the left side; the extractor bolt can then be removed by inserting a drift in the hole on the left side of the gun, and giving it a light blow with a hammer. Take out the fixing screws of the cover; the latter, with actuating bolt and spiral spring, can then be withdrawn.

TO DISMANTLE THE STRIKER.

To Remove the Trigger.—Press down the projecting portion of the

spring clear of the recesses in the cap, and unscrew the cap; the trigger can be then withdrawn from the striker.

To Remove the Main Spring.—Remove the trigger as described above. Use the cocking-handle or wrench "F" as a tommy, unscrew the nut for sheath (formerly called the assembling nut); the latter, with its washer, can then be removed. Take off the steel head and retaining nut; the main spring can then be withdrawn.

To Remove the Needle.—Take off the cocking-handle for Mark I striker, or wrench "F" for Marks I* and II strikers, and, using either as a wrench, unscrew the nuts of the needle; the nuts and leather washer can then be removed. The needle, with leather washer, can then be withdrawn from the sheath.

To Remove Firing Pin Marks III and IV Needles.—Take out the check screw from under the head of the needle, when the latter can be unscrewed and removed, the firing pin can then be taken out.

To Replace Fittings.—The fittings are replaced in the reverse order.

NOTE.—All removable fittings should occasionally be taken entirely apart, and examined, in order to ascertain that they are quite sound, and in good working order; any in which a crack is observed should be exchanged. The electric and percussion striker should be tested to see that the insulation is not defective, and the protusion of striker referred to at page 6 gauged (*vide* instructions, "Regulations for Care and Preservation of War Matériel, &c.") All springs should be examined to see that they are serviceable. The inner end of the extractor bolt should be examined, to see that the shoulder for the reception of the head of the cartridge is in good condition. In the event of the hole in the firing bush in the inner end of the breech screw becoming enlarged by erosion, the bush should be removed and replaced by the spare one.

APPURTENANCES, &c.

SIGHTS.

The gun is not prepared for sights.

For automatic and rocking-bar sights, *see* Carriages, pages 13 and 21.

BOX, SPARE PARTS.

The box is of wood, with hinged lid, and hook fastening, and will vary in size according to the number of guns in a group. It is provided locally, there being no scaled pattern. The box is intended to hold spare springs, and such other small stores of the gun and mounting as it may be considered desirable to keep in it.

CLINOMETER, LARGE, MARK I.

This instrument is fitted with a metal drum which is graduated to 45 degrees. For method of using the clinometer and its care, *see* page 46. When not in use, the clinometer is kept in its leather case or wood box; the latter will be obsolete when stock is used up. Either is a separate store to the clinometer.

IMPLEMENTS.

The proportion of implements allowed will be found in the Equipment Regulations.

Can, Lubricating, No. 10.—This is of tin.

Gauge, Striker Protusion.—The gauge is of steel, for gauging the protusion of the striker (firing mechanism of the gun), according to the stamped marking on the gauge; particulars as to using it will be

found in the "Regulations for Care and Preservation of War Matériel, &c."

Extractor, Cartridge, Hand, Q.F., Large.—This is of steel for removing cartridge cases by hand, on completion of the action of the gun extractor, see also page 30.

Ordnance, Q.F. or Q.F.C.—Bronze drift, lead hammer, and steel punch are used for removing and replacing the breech fittings.

Rimer, Vent, Axial, Short.—This is of bronze, and is used for the cartridge adapter for percussion firing only.

Wrenches.—These are of steel; the "wrench bush firing hole" is for removing and replacing the bush of firing hole; the "wrench D" is for nuts of axis pins of breech mechanism, and all large screws; "wrench E" is for extractor and all small screws; and "wrench F" for use with Marks I* and II strikers.

SIDE ARMS, &c.

Brush, Piasaba, 6-inch, No. 2 (for B.L. 6-inch, Marks VII and VII, and Q.F. 6-inch Guns), Mark I.*—The brush is used for cleaning the bore of the gun, in conjunction with a sponge cloth or piece of canvas tied on the head.

The head is of elm, having piasaba tufts secured into it by pitch or marine glue.

The stave is of ash, and is secured in the head by a copper rivet. It is fitted with a metal socket joint, which consists of a metal plug fixed to the stave end, and a metal cylinder fixed to the brush stave; the plug is inserted in the cylinder, and secured in position by a thumb screw fitted to the cylinder.

Total length, with end stave, 23 ft.

Brush, Piasaba, 6-inch, No. 3 (for B.L. 6-inch, Marks VII, VII, IX and X, and Q.F. 6-inch Guns), Mark I.*—The brush differs in length from No. 2, and is intended to supersede the latter.

Total length, with end stave, 24 ft. 9 in.

Stave End, Q.F., 6-inch to 4-inch, Mark II.—This is for lengthening the stave of the piasaba brushes, as above described; it is of ash, fitted with a metal plug to suit the socket joint.

Length, 11 ft. 3 in.

Ejector, projectile, Q.F., 6-inch land, Mark I.—The ejector is used for drill purposes.

The head is of elm, secured to a pine stave by means of a copper rivet; it is fitted with a copper strengthening band, and recessed to clear the nose fuze.

A band for the attachment of guide ropes is fitted to the end of the stave.

Total length, 19 ft. 11½ in.

Rammer Q.F. or Q.F.C., 6-inch Mark II.—This has a sabicu head, with a metal ring to preserve it from injury by the screw thread of breech; the stave is of ash.

Total length, 4 ft. 6 in.

Lanyard, friction tube, Siege No. 1.—This is the ordinary siege lanyard, Mark IV, which is made of white line tarred, with a wood toggle at one end and a hook at the other for attaching to the loop of the trigger when firing by percussion.

Length, 5 ft. 5 in.

Tampeon, B.L., Q.F. or Q.F.C., 6-inch without stave, Mark III.—This consists of a wood inner disc, having a metal bush with a hole in the centre threaded for the spindle, and an outer metal flanged disc which is bored out to take the centre spindle. Attached to the

discs is a covering of fearnought, which forms a cylinder which is stuffed with horsehair. The central spindle is cross-handled and is secured in the outer disc by a shoulder on the outside, and a metal collar and pin on the inside, while its opposite end is threaded to suit the bush of the inner disc. It acts by turning the spindle, by means of the cross-handle; the discs are brought toward each other, thus expanding the stuffed portion to grip in the muzzle of the gun.

Note.—Tampeons are now being replaced by muzzle covers, the former being returned to store when no longer required.

Cover, muzzle, No. 5. (For Q.F. 6-inch, and B.L. 6-inch gun and howitzer).—The cover is made of waterproofed canvas, and is secured to the muzzle by a leather strap.

CARE AND PRESERVATION OF ORDNANCE AND FITTINGS, AND AIMING RIFLES.

See also "*Regulations for Care and Preservation of War Matériel, &c.*"

The following is a list of the oil-holes in the gun and fittings, which require to have the screws occasionally removed, and oil poured into the channels, so as to lubricate the parts without removal of the fittings. Care must be taken to replace the screws immediately after oiling:—

Fittings to be lubricated.	Position of oil-hole.
Carrier, hinge bolt.	Top of hinge bolt.
" joint.	Lower part of carrier on right side.
Lever, breech mechanism, axis pin.	Top of axis pin.
Link, sliding block.	" outer end of link.
Bush "	Left side of carrier.
Breech screw.	In parallel portion of breech screw.
Extractor, bolt.	In screw plug, left side of gun at breech.

RIFLE, AIMING, 1-INCH, MORRIS, Q.F., 6-INCH.

(Plate III.)

This apparatus is designed for use with either 1-inch or aiming tube cartridges, and is for use with the gun in imparting instructions in laying, and consists of the following parts:—

Rifle, aiming, 1-inch Morris, Q.F.,	
6-inch	steel 1
Cylinders, anti-fouling, 4.7-inch and	
6-inch guns (Mark I.)	converted 6-pr., cart- ridge case, securing bush, and two set screws.
Tube, 0.23-inch "C"	steel, with nut and washer 1

Implements.

Rifle, aiming, 1-inch, Morris, Q.F.—				
Extractors, {	barrel, steel	...	...	1
	cartridge, steel...	...	...	1
Rifle, aiming, 1-inch—				
Brush, cleaning, without rod...		...	...	1
Rod, cleaning, wood		...	...	1
Tube, 0.23-inch—				
Brush, cleaning, without rod...		...	...	1
Rod, cleaning, 36 inches long		...	...	1

The 1-inch barrel, *a*, is rifled and chambered on the Henry system, there being 11 grooves $31\frac{1}{2}$ inches long with a uniform twist of 1 turn in 35 inches. A movable bronze collar, *b*, having a taper corresponding to that of the barrel chamber of the 6-inch Q.F. gun, is screwed over the exterior of the barrel, and in conjunction with a steel disc, *c*, screwed to the breech end, serve to retain the barrel in position when it is in the gun. A recess is formed at the breech end of the barrel for the reception of the "extractor, cartridge."

The cartridge is detonated by means of the firing mechanism of the gun.

The aiming rifle is withdrawn from the gun by means of a tube extractor, which is passed through a hole prepared in the upper side of the steel disc for the purpose.

The anti-fouling arrangement consists of a 6-pr. Q.F. brass cartridge case, the base of which is bored out and screw threaded to fit on to a steel securing bush fitted on the barrel of the rifle near the muzzle, the securing bush being secured by two set screws, the points of which are hardened so as to hold on the barrel; this anti-fouling arrangement is made locally.

The 0.23-inch "C" aiming tube, *d*, is of special pattern; it is furnished with brass collars, *e*, which fit the larger tube, and it is secured by a nut and washer at the muzzle end.

When the aiming rifle is used in guns mounted on carriages which are fitted with automatic sights, and to give increased practice in laying with these sights, the ordinary cam of the automatic sights will be substituted by a cam cut to the range limit of the aiming rifle.

Care and Preservation.

All actions and parts of the rifles and tubes should be kept perfectly clean and oiled, so as to keep them in good working order and prevent rust. No cutting material, such as emery cloth, is to be used for cleaning.

Ammunition used, see p. 31.

CARRIAGES, GARRISON, Q.-F., 6-INCH.

Mark.				Elevation, in degrees.	Depres- sion, in degrees.	Height of axis of trunnions from top of pedestal.	Weight of carriage on racer, without shield.
I	..	..	..	20	10	Inches. 42.3	cwt. qr. 78 $0\frac{1}{2}$
II	..	..	..	20	10*	42.3	84 0

* The shield may be cut locally to allow 20 degrees where necessary.

CARRIAGE, GARRISON, Q.F., 6-INCH, MARK I.

(Plates IV to IX.)

The carriage is constructed to allow 20 degrees elevation and 10 degrees depression, and to revolve about a central pivot on ball bearings.

The gun recoils axially in a cradle which is fitted with an hydraulic buffer to limit the recoil to about 12 inches (the extreme recoil is 15 inches), and two sets of springs to return the gun to the firing position.

The carriage generally consists of the cradle *A*, under-carriage *B*, automatic and rocking bar sights, elevating and traversing gears, and for the present elevation indicator gear, shoulder piece and sighting platform, electric firing, and illuminating sight gears, shield *C*, with pedestal *D*, and holdfast.

Cradle.

The cradle *A* is in one casting of steel, with trunnions to pivot it in the under-carriage *B*, cylinders on each side to take the running-out springs, and a shorter cylinder along the centre of the underside for the hydraulic buffer. The hydraulic buffer cylinder (Plate VII) is of steel 21.9 inches long with an internal diameter of 7.498 inches; the test pressure is 5,500 lb. per square inch; the front is prepared to take the controlling plunger and end of valve key, and the rear is threaded for the stuffing box; it is secured in the cradle cylinder by a screwed portion near the rear, and a screw plug underneath; the latter also screws into and secures the valve key; there is an emptying hole underneath at the rear which is closed by a screw plug; it is closed with a manganese bronze stuffing box *r*, with leather washer in front, and is packed with cotton packing, secured with a metal gland from the rear, and an L leather ring, secured with a metal ring from the front of stuffing box. The piston and rod are in one, the piston head has an opening *s* cut in its edge, which, when the gun is recoiling, passes over the valve key *t* fixed along the cylinder; this key varies the opening for the flow of the oil, and this is so regulated as to ensure an approximately constant pressure during recoil; while to prevent scoring the cylinder the periphery of piston is fitted with a manganese bronze ring which is dovetailed into a groove having interrupted ridges which prevent the ring turning; the piston rod is bored out from the front for the controlling plunger, and the opposite end is threaded on the circumference for the nuts connecting gun and buffer.

A controlling plunger *u* is fixed by a metal nut, with leather washer, to the front end of the buffer cylinder; it is of steel, having a hole along the centre to allow the liquid to pass from the plunger hole of piston rod, the flow being regulated by an adjusting plug (*u'*); on the plunger entering a hole in the piston rod, and by displacing the oil therein, forms an hydraulic cushion, which gradually brings the gun to rest when returning to the firing position.

The quantity of oil required for the buffer is about 10 quarts, part of which is contained in a tank formed at the right side of the cradle, and is filled from the top; this tank communicates with the front part of buffer through a small hole, thus maintaining the full quantity of oil in the buffer. A small air-hole passes through the cradle into the buffer near the rear, and is closed by means of a long air plug which has a coned seating.

The running-out springs (Plate VII) have each a plate in front, connected by a rod *v* to the cross bar which is attached to the breech

ring; these springs are compressed during recoil, and their expansion returns the gun to the firing position.

The bottom of the cradle has a recoil guide with manganese bronze anti-friction liner for the projection on gun, also anti-friction bearings of the same material at the front and rear for the under side of gun.

In addition to the buffer attachment, the gun is secured in the cradle by a steel band which is attached to the top of the cheeks by screws; this band has a recoil guide with anti-friction liner for projection on gun, and there is a screw hole on top for lifting eye bolt.

The left side is prepared for the elevating arc, which is attached by two screws.

A 12-inch plane, for clinometer, is cut on the top of the left cheek near the rear. In cases where it is found that this plane and that on the gun give different readings, the cradle plane must be adjusted to give corresponding readings to those on the gun.

On the left side of the cradle is a projection, to which is bolted a metal bracket for supporting the sighting gear, and a brass guard is fitted to the rear of the cradle for the protection of the number laying the gun.

Under-carriage.

The under-carriage *B* consists of a fork-shaped steel casting formed at the top with trunnion bearings to support the cradle, which is secured by two metal capsquares, each with two steel pins with chains, and the centre is so shaped and fitted with metal bushes to fit over the pivot and revolve on the anti-friction balls. These balls run in a groove between hardened rings to prevent wear; the rings are fitted one on the top of the pivot, the other to the under side of a plate bolted to the under-carriage over the pivot. The pivot is of steel, 61 inches long over all, and machine fitted throughout; above its centre is a cylindrical shoulder, on which it is supported in top of the pedestal; this shoulder is 16 inches diameter, and the pivot is tapered both above and below it; a circular groove is cut in the upper surface for the anti-friction balls before mentioned.* On the left side of the under-carriage is bolted a steel bracket, which supports the elevating and traversing gears, and on the right side is bolted a similar bracket which carries an alternative quick traversing gear. Sighting platforms *L*: one is now provided for each side; to the left one is attached the "carrier, battery box, No. 8," for battery electric firing, &c. In cases where 10 degrees depression or more are required, a clip bracket and clip are provided as for Mark II, carriage, page 21.

Sighting Gears.

Originally this carriage was supplied with a rocking bar sight only, which was fitted at the left side. The latest approval provides for an automatic sight at the left side, and a rocking bar sight at the right side of the carriage.

Automatic Sight Gear.—This gear is fitted to the left side of the carriage, see Plate VIII. It is converted from the "combined automatic and rocking bar sight," previously approved for this carriage, the sighting blades, for use in conjunction with the elevation indicator gear, and certain other parts are removed from the combined sight gear, the catch in the fork end of the cam roller lever being retained in a fixed position by means of a spring which is secured to the lever, thus the sight becomes a simple automatic one, and is generally similar to that fully described for the Mark II. carriage, page 21.

* Formerly two lifting holes were provided at the side of the pivot, but in latest manufacture of pivots there is only one hole at the top.

The sight is set at angle of 1 degree 30 minutes correction for drift due to rifling. For night firing the sights are illuminated, and the gear for the purpose is generally similar to that described for the Mark II carriage, excepting that the rheostat is secured to a supporting plate which is bolted to the carriage, and the electric cables which differ in length, thus:—

Gear, electric, illuminating sight—

Cables—

“X,” No. 6, blue at ends. From battery to rheostat 3 feet 8 inches long, for B.L. 6-inch C.P. Mark I, Q.F. 6-inch Mark I, and 4.7-inch C.P. Mark I* carriages,

“Y,” No. 3, Brunswick green at ends. From rheostat to cable connecting lamps. 8 feet long, for Q.F. 6-inch Mark I and 4.7-inch C.P. Marks II, IV, and V carriage.

“Z,” No. 7, burnt umber at ends. Connecting lamps. 2 feet 9 $\frac{2}{10}$ -inch long, for Q.F. 6-inch Mark I carriage.

An adjustable shoulder-piece to facilitate laying is also provided.

Rocking Bar Sight Gear. Plate IX.—The sight gear is attached to the right side of the carriage, and it mainly consists of a sight bar (a), rocking bar (b), and carrier (c). The sight bar, with fittings and telescope is similar to that of the automatic sight gear, the rocking bar and carrier are somewhat similar to those of the auto-sight gear, but, of course, differ in shape and fittings, and in present manufacture the carrier is secured by hexagon-headed screws, instead of T-shaped head ones.

To the underside of the rocking bar is attached an arc (d), having as its centre the centre of the axis pin of the rocking bar, the arc, working through a socket in the carrier, is prevented running down by the friction of a flat spring secured in the socket; a rack is formed on the front face of the arc which is actuated by gear fitted to the carrier; this gear consists of a metal bracket attached to the carrier, and which contains an arc pinion, the latter having on its spindle a worm wheel in gear with a worm spindle which is set in motion by its handwheel (e); on one end of the arc pinion spindle is a drum (f), having on its periphery a crown metal yard scale, graduated to the full amount of range given in the range table (if possible) for a full charge, and with the M.V., thus 10,900 yards, with M.V. of 2154 f.s. The markings on the ring are in black, and the range is read off by the aid of a reader which is attached to the rear of the carrier. A removable strip is attached to the rear face of the arc (b), which is graduated to 20 degrees, the graduations being read off over the carrier at the rear. The sighting is kept rigid by friction of the worm gear and the flat spring in the arc socket, and the arc is prevented running out of gear by a stop on its lower end.

The angle at which the sight is set to compensate for drift due to rifling is the same as for the auto-sight.

For description of the telescope, see page 19.

Gear illuminating sights is not provided.

Elevating Gear (Plate IV.)

The elevating gear is supported in a metal bracket, which also forms a standard for the support of the elevation and traversing indicators (where used), the pistol grip for electrical firing, and shoulder piece.

The elevating gear is actuated by the hand wheel E, which transmits motion through worm wheel gearing to the elevating arc F, fixed to the cradle. A frictional arrangement to allow a slight slip on the

gear to reduce the liability to damage when firing, is fitted in the hollow of the worm wheel; it consists of alternate discs of steel and metal, respectively arranged to revolve with the spindle and worm wheel. These discs are pressed together by a nut, acting on a spring steel washer, the pressure being adjusted to produce sufficient friction to prevent the gun running down when at rest.

The depression of the gun can be limited by a bolt and nut fixed to the front of the under-carriage; the bolt can be adjusted as found necessary to suit local requirements.

Traversing Gear (Plate IV.).

Traversing is effected by worm wheel gear actuated by the hand wheel *G*, on left side of carriage, the whole system being revolved by a pinion *H*, gearing into a circular rack *I*, fixed on the top of the pedestal. When it is required to work the alternative gear the worm wheel is thrown out of action by releasing a clamping arrangement contained in the hollow of the worm wheel. This arrangement consists of a series of steel and metal discs which are jammed together or released by turning the hand wheel *K*.

The alternative quick-traversing gear on right side of carriage consists of a spur wheel and pinion gear, which is revolved by a hand wheel working vertically. This gear actuates a similar pinion to *H*, of the worm wheel gear, and engages with the same rack. The difference in speed for one revolution of the hand wheel is 5 to 1.

Elevation Indicator Gears (Plate IV.).

The indicators are for recording the yards of range and degrees of traverse, and consists of two large aluminium drums *M*, with the yard scales and degrees engraved around their respective circumferences; the drums being placed close together and covered with one pointer *N*, so that they can be readily seen and quickly read by the laying number.

The elevation indicator drum is revolved by a phosphor bronze driving band, each end of which is connected to the extremities of a quadrant *O*, the centre of which fits over a hexagonal projection on the left trunnion of the cradle. The band passes over the boss of the drum, which is studded with small projections to fit into corresponding holes in the band to prevent the latter from slipping, and its tautness is ensured by small spiral springs *P* at the points of attachment with the quadrant. As the quadrant is at right angles with the axis of the cradle, the slightest movement of the latter is immediately transmitted to the drum, and the yards of range at once indicated. However, when telescopes are provided for automatic and rocking bar sights, the elevation indicator gear will be removed.

The traversing indicator drum is also actuated by a phosphor bronze driving band, one end of which is fastened to a metal drum rigidly fixed to the top of the pivot, the other end being passed through a hole in the side of the under-carriage around a guide pulley *Q*, and from thence to a spring barrel on the indicator drum to which it is attached. Inside the spring barrel is a stout spring which tends to revolve the drum in one direction; consequently the band is always kept taut, as the carriage, when traversing, winds or unwinds the band around the fixed drum on the pivot, and so turns the indicator drum.

Electric Firing Gear.

The gear generally consists of two contact boxes, two pistol grips, safety plug box, six electric cables, elbow-piece, connection cable to the battery box, and battery box containing four electric Le Clanché cells with connecting wires.

The contact boxes are of gun-metal, and are called "boxes, contact, sliding, carriage, 6-inch and under 'plug,' 'plate.'" The "plug" has a contact spiral spring and insulating bush, and is keyed to a gun-metal supporting bracket, No. 2, attached to the cross-bar at the rear of the gun. The "plate" has a contact, insulating bush and fixing screws, and is keyed to a supporting bracket, No. 2, attached to the carriage cradle at the rear. Contact is made when the gun is run up in the firing position.

The pistol grips are of Mark II pattern (in general use with Q.F. garrison carriages, except 12-pr. Q.F. Mark I carriage); they are of gun-metal, and each contains a firing key having two insulated contacts connected by a bent spring which is secured to the front contact by nuts, and, by pressing the spring on to the point of the other, by pulling the trigger of the pistol grip, contact will be made. The left-hand pistol grip fits into a socket of the bracket supporting the shoulder-piece, and is secured by a set screw, and the right-hand one is similarly secured in an adapter fitted to the rear of the traversing gear bracket. The electric cables are connected to the underside of the pistol grips by screwing in the nuts, the identification letter in each case should agree.

The safety plug box, No. 2, is provided to prevent the gun being accidentally fired, owing to there being a pistol grip on either side of the carriage, the electric current being confined to the required side by the insertion of a safety plug within the box. The box is of gun-metal, with lettered contact holes to receive the nut connections of the cables, and one spare hole which is closed by a mill-headed screw and unlettered; this spare hole may be used for a tester. The box is secured to the left side of the carriage by a plate and screws, and it is provided with a padlock and key.

The six M.I. electric cables are copper wire braided with metal split pin terminals (except one end of "A" cable which is forked) and connecting nuts; each cable being of suitable length, and having a distinguishing colour, letter, and number, the two latter are engraved on the nut connection at the end of each cable, and are filled in with red wax. "A" cable has a nickel-plated fork spring contact for connecting on to the Marks I* to IV pattern needles of the gun striker. The metal nut of the cable being screwed on to the elbow-piece, the other end of the cable is screwed into the "plug" contact, and is supported by a hook on the gun. The following are the particulars of the cables, and those connected to the right-hand pistol grip are passed under the carriage:—

Gear, electric, firing—

Cables—

- "A," No. 3, white. From gun (elbow-piece) to sliding contact, 4 feet $7\frac{1}{2}$ inches long, for Q.F. 6-inch Marks I and II, and B.L. 6-inch C.P. II carriages.
- "B," No. 6, purple. From sliding contact to safety plug box, for 6-inch and above, 3 feet long, for Q.F. 6-inch Mark I carriage.
- "C," No. 5, red. From right-hand pistol grip to safety plug box; 9 feet 6 inches long, for Q.F. 6-inch Mark I carriage.
- "D," No. 4, yellow. From right-hand pistol grip to battery connection; 8 feet long, for Q.F. 6-inch Mark I, and B.L. C.P. Marks III A and B carriages.
- "E," No. 5, black. From left-hand pistol grip to safety plug box; 2 feet long, for Q.F. 6-inch Mark I carriage.

"H," No. 6, uncoloured. From pistol grip to battery connection, left-hand for 6-inch and above; 2 feet 6-inches long, for Q.F. 6-inch Mark I carriage.

The split pin terminals on the cables should be kept slightly open to ensure good contact.

The metal elbow-piece screws on to the striker sheath, and is for protecting the outer end of the striker needle, and for supporting and giving a lead to the "A" cable. A projection on the elbow-piece serves as a cocking-handle when firing by percussion.

The "connection cable to battery box No. 4" (for Q.F. 6-inch and B.L. 6-inch C.P. carriages), is of gun-metal with insulator and contact, with gun-metal and ebonite washers; this connection is provided with contact holes to receive the cables of the firing and illuminating sight-gear respectively, and one for connecting it to the battery box, there is also a spare hole, while for the return current the connection is provided with a plain socket to fit over a contact stud on the battery box. The connection is secured to the carrier battery box alluded to at page 13.

The battery box and electric battery.—The battery box (V, Plate X) is secured to the carriage in its carrier and supporting plate, and it is made of No. 11 S.W.G. galvanised steel, about 13 inches long, 10 inches deep, and 6.5 inches wide (the handles and fly nuts each project 1.75 inch and 1.5 inch respectively in addition to the above); it is lined with wood, which is saturated with paraffin wax, the wood lining is faced with fearnought to the height of the cells, and three strips of indiarubber are secured along the bottom for the cells to stand upon; two lifting handles are provided. The lid is lined with sheet indiarubber, for the purpose of keeping the interior dry and clean, and wood which is shaped to fit over and steady the cells, all being secured together by glue and brass screws; the lid is secured to the box by a hinged screw and fly nut at each end. On the outside of the box are two metal split contact studs to fit in the sockets of the "connection, cable to battery box," before mentioned; the upper contact is secured by copper rivets, which pass through the side of the box, lining, and copper strip for connecting the positive pole of the battery, also the necessary ebonite insulating washer on the inside and outside of the box, the lower contact is simply secured to the steel box by copper rivets, for the return current which flows through the steel box to a copper strip, one end of which is rivetted to the box, the other end is passed through the wood lining and then secured to the negative pole of the battery.

The battery in present use consists of four electric cells, Lo Clanché, A, Mark III. These cells are of ebonite, rectangular in shape, 8.75 inches by 5.55 inches by 2.7 inches, 6 block agglomerate; they are issued filled and sealed, and all that should be necessary to set them in action is to fill them three-parts full with a saturated solution of sal-ammoniac in water, as described for their care and preservation in the Regulations mentioned hereafter. The cells are put in position in the box, with a felt piece between each one, and then connected up to the copper strips, before mentioned, and each cell in series, *i.e.*, the positive pole of one cell to the negative pole of the next, and so on, by means of a wire, and two mill-headed nuts for each terminal.

The circuit is completed to the side of the carriage required by inserting the safety plug in the correct hole of the safety plug box, and the gun fired by pressing the trigger of the pistol grip, which forces the spring of the firing key down on the contact, thus com-

pleting the circuit through the striker of the lock to the tube and cartridge. The return current passes back to the firing battery through the general system (gun and carriage).

Care and Preservation.—The split contact studs on the box should be kept slightly open to ensure good contact in the sockets of the "connection, cable to battery box." For care and preservation of the cells see "Regulations for Care and Preservation of War Matériel, &c."

Shield.

The front of the shield is curved, of $3\frac{1}{4}$ -inch steel plate; secured to this is a $1\frac{1}{4}$ -inch steel plate on either side, the whole to protect the front and sides of the carriage. The front is cut away for the gun and sights. The shield is supported by curved stays bolted to the under-carriage.

Weight of shield with attachments, $80\frac{1}{2}$ cwt.

Bridge, protecting sight.—The shield is now provided with a bridge of T steel, to protect the sights, when putting on, or taking off, the carriage cover.

The following pedestal, levelling ring, holdfast, traversing arc, cover, telescope, and special implements, &c., are used with this carriage:—

PEDESTAL, CARRIAGE, No. 2.

Mark I pedestal (*D*) is of cast-iron, having in the direction of its length strengthening webs with holes for lifting purposes. It is formed to receive, at the centre and upper end, the pivot and the traversing rack respectively, the rack being secured by screws; and at the lower end a flange which is prepared for the holding-down bolts of the levelling-ring and holdfast; drain holes are provided; there are also three holes tapped for the levelling screws, which are of steel, $1\frac{1}{8}$ inch in diameter and 5 inches long, hexagon headed, with hardened steel points, and are intended to allow of the pedestal being raised as may be required for the insertion of packing, when necessary to level the carriage for use with automatic sights.

Mark II pedestal is for future manufacture; it is stronger than Mark I, and only one web has a small hole for lifting purposes.

To Level the Pedestals.—1. Unscrew the nuts of the holding-down bolts.

2. Force down the steel screw or screws until their points, acting on the levelling ring beneath, raise the pedestal to the height required.

3. Insert the necessary packing between the base of the pedestal and the levelling ring, care being taken that the packing is fairly distributed.

4. Release the raising screw or screws, and securely tighten the nuts of the holding-down bolts.

The bolts and screws should be freely greased to prevent rusting.

NOTE.—The above levelling arrangement will not often be necessary when the correcting gear for inclination of pedestal and pivot is supplied with automatic sights.

RING, LEVELLING, No. 2 CARRIAGE PEDESTAL, MARK I.

This is a cast-iron ring, 4 inches thick, secured under the pedestal by the holding-down bolts of the holdfast; its use is described with the pedestal.

Weight $25\frac{1}{4}$ cwt.

HOLDFAST, CARRIAGE PEDESTAL, No. 2, MARK I.

The holdfast consists of seven anchoring plates and 28 holding-down bolts; the bolts are 8 ft. 11 in. long, with bulb heads with key for recess and key way in the anchoring plates, and in the latest manufacture a cotter, which passes through each bolt above the anchoring plate, is also provided; six of the bolts have two nuts each, the others one, the six extra nuts being screwed down below the levelling ring so as to steady the holdfast while being embedded in concrete to the level of the ring; the other nuts are screwed on above the flange of pedestal, thus securing the whole system.

Weight of { bolts, holding-down 15 cwt. 2 qrs. 20 lbs.
plates, anchoring 10 „ 3 „ 4 „

ARC, TRAVERSING, No. 36, MARK I.

The arc is of gunmetal, and it is graduated into degrees reading to quarter degrees, the figures being on the outer part. It has a radius of 2 ft. 8½ in. and is secured on the top of the pedestal, and the angle of traverse is indicated by a pointer on the carriage.

COVER, CARRIAGE, Q.F., MARK I, 6-INCH (MARK I).

This is of waterproof canvas, and is for protecting the carriage and breech of gun.

TELESCOPE, SIGHTING, { No. 1. (L).
„ 3. (L).

In wood case, for automatic and rocking-bar sights; garrison carriages.

No. 1, Mark I telescope is about 25 inches long overall; it has an object glass and terrestrial eyepiece; the lenses are of such sizes as will obtain a large field of view with a low magnifying power; the magnification is about 3 diameters, and the field of view is about 10 degrees; hitherto, crosswires and a pointer were provided, the former are now removed, and the latter is primarily designed for night use. There are two gunmetal bearings externally about the centre, each 3½ inches long, and 2¼ inches diameter, which allow 3 inches of movement to suit the convenience of different gun-layers. A long dew cap is fitted over the object glass end, and is provided with a loose metal cap.

The eyepiece with india-rubber shield, to protect the forehead of the gun-layer from shock when firing, screws on to the main tube of the telescope, and is fitted with a broad 3-ring milled focussing nut.

No. 1, Mark II differs from Mark I telescope in having improved focussing arrangements. The focussing is affected by turning the eyepiece portion of the tube, the amount of turning movement being read off on a scale numbered 0 to 7, so that individual observers may set their focus to the figure previously determined. The length is 24 inches.

No telescopes of this Mark have been issued with crosswires, but they are provided with a diamond pointer fixed at the focal length of the object glass.

Weight about 6 lb. 10 oz. Mark I, 7 lb. Mark II.

No. 3, Mark I, is generally similar in construction, length, and weight, to No. 1, Mark II, but is of higher power, *i.e.*, magnification 10, the field of view is 3½ degrees, and the pointer is Λ shaped.

Full particulars as to care and use of the telescopes are secured to the inside of the lid of the wood cases in which the telescopes are kept when not in use. Ordinary chamois leather is used for cleaning the object glass of the telescopes.

SPECIAL IMPLEMENTS, &c.

The proportion allowed will be found in the Equipment Regulations.

Spanners.—No. 175 for adjusting automatic sighting gear, No. 186 is for spring compressor and cover for springs.

No. 187, for elevating pinion.

No. 188, for nuts of plunger controlling running out, and stop depression.

No. 190, for sighting gear.

Spanner, Hydraulic Buffer.—No. 97 is for stuffing box, piston rod gland, and ring securing leather packing, and piston rod nut.

Driver, Screw.—No. 10, for small screws of automatic sighting gear. No. 13, for air, filling, and drain plugs and contact boxes.

Eyes, Lifting.—No. 1, No. 2. No. 1 is for lifting the pivot and No. 2 the cradle or shield.

Wrench Pivot, No. 6.—This is for the screws of elevating arc, band retaining gun in cradle, and preserving hole for cradle lifting eye.

CARRIAGE, GARRISON, Q.F. 6-INCH, MARK II.

(Plates X to XII.)

The carriage is constructed to allow of 20° elevation, and 10° depression with the shield and 20° without, and to revolve about a central pivot on a series of anti-friction balls. The pivot is contained in the pedestal, which is secured to the emplacement by the holdfast. The gun recoils in a cradle, which is fitted with an hydraulic buffer to limit the recoil to about 12 inches, and with springs to return the gun to the firing position. The cradle is fitted with two sets of sights, rocking bar on the right side, and automatic on the left.

The carriage consists of the following principal parts:—Cradle, under-carriage, sights, elevating and traversing gears, and for the present elevation indicator gear, shoulder-piece, and sighting platform, electric-firing and illuminating sight gears, and shield, mounted on a pedestal and holdfast.

Cradle.

The cradle, A, is of steel, and differs from the cradle of Mark I carriage in the following particulars: in the attachment of the elevating arc, which in this case—two bosses or lugs are formed on the underside of the left hand spring tube; two lugs are formed immediately over the trunnions to take the sight brackets; the lugs are truly surfaced, and the greatest care should be observed with these parts, as any bruising or disturbance of the surfaces will affect the accuracy of the sights; the anti-friction guide liner and bearings in bottom of cradle are of gun-metal.

A steel cover is provided to keep out dirt and wet. This cover is secured to the top of the cradle sides by screws, and it is cut away so as to clear the clinometer plane.

Under-Carriage.

The under-carriage B, is of cast steel, formed at the top with trunnion bearings to support the trunnions of the cradle, and at the bottom with a socket (fitted with metal bushes) to fit over the pivot; gun-metal cap-squares are provided, which are interchangeable with any mounting of the same nature. It revolves on a series of anti-

friction balls contained in a circular groove cut in the top of the pivot, the balls supporting the carriage by means of a bearing plate attached by screws to the upper part of the socket. A hardened steel ring is let into the groove at the top of the pivot, and a similar one into the bearing plate, to reduce wear due to friction. On the left hand side plates gunmetal brackets, K, are bolted for carrying the elevating and transversing gears; the three upper ones being formed as boxes with covers for enclosing the gears, and the lower one is provided with a cover for a similar purpose. Two gunmetal brackets are fixed on the right side plate for supporting an alternative quick-traversing gear. Under-carriages are now manufactured with a flat surface on the front of the pivot socket, for the attachment of a clip bracket and clip, to engage under the projection on the rack, in cases where 10 degrees depression or more are required from the carriage; carriages not having this flat surface are provided with a special clip where 10 degrees depression or more are required. A pointer is provided for use in reading the degrees of traverse.

On the top rear side of left side plate is fixed a bracket carrying a stud, on which the shoulder-piece, T, pivots, also a socket for pistol grip; the shoulder-piece being fixed in the required position by a clamping screw.

The sighting platform, U, is bolted to the rear side plates; it is provided with handrails on each side, and is open to the rear, and is reached from structures in the emplacement. The "carrier, battery box, No. 1" is secured on the upper side of the platform.

Sighting Gears.

The latest approved sights for this carriage is an automatic one at the left side and a rocking bar one at the right side of the carriage.

Automatic Sight Gear, Plates X and XI.—This is attached to the left side of the carriage, and it principally consists of a metal bracket (a), which supports the gear by being secured to a lug on the cradle; carrier (b); rocking bar (c); sight bar (d), with fore and hind sights, and holders for a telescope; cam (e) and securing bracket, or sliding block (f); cam roller lever (g), with cam roller; spiral spring in case (h); tidal adjusting lever (i). A correcting gear for inclination of pivot is provided in most cases.

The carrier is connected to the bracket (a) by means of two steel eccentric adjusting studs (the front stud gives an up or down movement to the sight, and the rear stud a forward or a rearward movement).

To the front end of the carrier is pivoted the rocking bar, which has a vertical movement; the front end of this bar carries the sight bar, while the rear end has a cross-head which is furnished with a deflection nut, the latter being actuated by a screw with milled heads, a projection on the deflection nut gears into a socket hole in the rear of the sight bar, thus moving the latter horizontally as the milled heads are worked. The cross-head is provided with a crown metal deflection scale plate, graduated to 2 degrees right and left, the amount of deflection being indicated by a reader attached to the deflection nut; the markings on the scale are in black.

The sight bar is of steel tubing, and, as before stated, it has a horizontal movement; it is provided with projections to take the sights, two holders for a telescope, recesses for the electric lamps, and a socket hole for the deflection nut.

The fore sight is acorn pointed, the rear of the acorn is cut away, and a small crown metal reflector is inserted to facilitate laying with the electric incandescent lamp, the sight is fitted to the front end of the sight bar, and is secured by a small screw; it is protected by a hinged cover when not in use.

The hind sight consists of a steel frame having a V notch, with a glass slip inserted for use with the electric incandescent lamp. Deflection is given by means of the deflection nut, before described.

A telescope is provided for laying on distant objects, or where extreme accuracy is required. The telescope fits in two holders on the sight bar, and is capable of being adjusted to suit different layers, the holders being provided with hinged caps to retain the telescope in position. For description of the telescope, which is a separate store, see page 19, either No. 1 or No. 3 may be used as required.

The angle at which the sight is set to compensate for drift is 1 degree 30 minutes.

The sight is controlled by the elevating gear of the carriage, the cam, to which the sight is connected by means of the cam roller lever, being so shaped as to ensure that the angle between the axis of the gun and the line of sight is always equal to the angle of elevation or depression for the range. The spiral spring in case, which is held in compression between the carrier and cam roller lever, serves to retain the cam roller on the lower end of the lever against the driving face of the cam. The cam differs in pattern, according to whether the carriage is fitted with correcting gear for inclination of pivot or not; if so fitted, the cam works in the slide block (*f*) attached to the lower carriage, and can be adjusted to suit the varying tide level by means of the adjusting lever (*i*), which works in an arc (*j*) with a graduated scale plate, the lever is secured in position by the jamming handle (*k*); if correcting gear is not provided, the cam is fixed to the lower carriage (by means of a bracket) and can be adjusted as to tide level by an adjusting lever working in an arc, the lever being secured when in position by a clamp and thumb nut. The amount of "rise" or "fall" of tide is set on the before mentioned arc scale by moving the adjusting lever, either pattern of which is provided with a pointer to facilitate doing so.

The before mentioned cams of the sight can be substituted by one cut to the range limit of the aiming rifle, when required, so as to afford increased practice in laying.

For the adjustment of the sight for slight errors observed in shooting, an adjusting screw is attached to the rocking bar, the screw is fitted with an "error of day" drum with a crown metal ring, which is graduated into a scale, the markings of which are in black, indicating arrows showing the direction in which the adjusting screw should be turned, and a clamp are provided, and a metal plate containing specific instructions for adjustments is now attached to the cradle, or some convenient part of the sighting gear.

The top of the rocking bar is used as a plane for the clinometer.

For night firing the sights are illuminated by incandescent electric lamps contained in recesses in the sight bar, the fore sight presenting a red point of light at the apex of the acorn, and the hind sight a white luminous V notch. The rest of the gear generally consists of three M.I. electric cables, each of suitable length, and with similar split-pin connections, as described for the cables of the firing gear (page 24), the four cell battery described for that gear being also used for this purpose; a rheostat, for regulating the electric current, is secured to the carriage at the rear.

The following are the particulars as to the designation, &c., of the cables:—

Gear, electric, illuminating sights—

Cables—

- "X," No. 4 Blue at ends.
From battery to rheostat.
1 ft. $1\frac{1}{16}$ in. long, for B.L. 6 in. C.P. Marks II and IV, and Q.F. 6 in. Mark II carriages.
- "Y," No. 4 Brunswick green at ends.
From rheostat to cable connecting lamps.
4 ft. 7 in. long, for B.L. 6 in. C.P. Marks II and IV, and Q.F. 6 in. Mark II and 4.7 in. C.P. Mark I* to V carriages.
- "Z," No. 4 Burnt umber at ends.
Connecting lamps.
2 ft. $4\frac{1}{16}$ in. long, for B.L. 6 in. C.P. Marks II and IV, and Q.F. 6 in. Mark II carriages.

The cable connecting lamps is secured to the sight bar by means of a "bracket, supporting Z cable, No. 1" and screws, and by "clips Z cable" and screws. The other cables are secured to the carriage by "clips, cable, B.L. and Q.F. carriages" and screws.

Formerly a "combined automatic and rocking bar sight" was employed with a certain number of carriages of this mark, having sighting blades for use in conjunction with the elevation indicator gear (page 24), but this kind of sight is being converted to the simple automatic design on the lines mentioned for that of the Mark I carriage (page 13).

When not in use the cam is protected from dust and dirt by a canvas cover.

To facilitate laying with the automatic sights a shoulder-piece (T) is provided; it consists of a wood stock, with a pliable pad of indiarubber fixed to it; it is made adjustable to suit the varying requirements of layers.

Rocking Bar Sight Gear.—This is the same as for the Mark I carriage (see page 14).

Elevating Gear (Plate X).

The elevating gear is actuated by means of hand wheels L (which can be worked either from the sighting platform or emplacement), and spur and bevel gears, which transmit motion through worm-wheel gearing with elevating arc, M. on underside of cradle.

A frictional arrangement is fitted to the hollow boss of the worm-wheel, and can be adjusted to allow of a slight slip to the gear when the gun is fired; it consists of alternate rings of steel and metal, arranged to revolve with the spindle and worm-wheel. The rings are pressed together by a nut acting on a disc spring, the pressure being adjusted to prevent the gun running down when at extreme recoil.

Plates on top of socket and underside of cradle form a stop for elevation at fully 20°; the stop for depression being formed by the chase of the gun and the shield.

Traversing Gear (Plates X and XI).

Traversing is effected by worm-wheel gearing actuated by a hand wheel, N, from left side of sighting platform, and by spur gearing actuated by the hand wheel, O, worked from the emplacement, the mounting being revolved by a pinion, P, gearing with the circular rack, Q, fixed to the top of the pedestal. The alternative quick-traversing gear consists of spur pinion and wheel gear, which is actuated from sighting platform by a hand wheel, R, on the right side of carriage; this gear actuates a similar pinion to that of the worm-wheel gear, and engages with the same rack. The difference of speed for one revolution of the hand wheel is about 5.33 to 1. When it is desired to work either the gear from the emplacement or quick-motion gear, the worm-wheel (on left side of carriage) is thrown out of action by releasing a clamping arrangement contained in the hollow of a worm-wheel; this arrangement consists of a series of steel and metal discs, which are placed together or released by turning the hand-wheel S. The angle of traverse is indicated on the arc (page 25) by the pointer (page 21).

Elevation Indicator Gear.

This is for indicating the elevation in yards of range.

The elevation indicator is carried by a bracket fixed to the lower elevating and traversing bracket on the left side of carriage, having formed in it a box containing a spring and spring spindle, enclosed by the disc graduated for yards of range. The spindle of the indicator is revolved by a P.B. driving-band, one end of which is fixed to the spindle, the other end being attached by means of an adjustable band-holder to a quadrant which is fixed to the left trunnion of the cradle. To the spindle is fixed one end of a flat coiled spring, the other end being secured to the bracket; this arrangement ensures the driving-band being kept taut. To the outer end of the spindle is fixed the indicator pointer, which provides for the slightest movement of the cradle being transmitted to the pointer and the yards of range indicated.

This gear will be removed from the carriage as soon as telescopes have been supplied for the automatic and rocking bar sights.

Electric Firing Gear.

This gear generally differs from that described for Mark I carriage (page 15) as follows:—

The "adapter pistol grip."

The safety-plug box is secured to the carriage by an angle bracket No. 2 at the left rear, or to the stay supporting shield.

The cables, except "A," differ in length only, and they consequently have a different number, thus:—

Cable—

"B," No. 9 is 4 feet 11 inches long, for Q.F. 6-inch Mark II., and B.L. 6-inch C.P. Marks I and IV carriages.

"C," No. 3 is 7 feet 10 inches long, for Q.F. 6-inch Mark II and B.L. 6-inch C.P. Marks II and IV carriages.

"D," No. 3 is 7 feet 1 inch long for Q.F. 6-inch Mark II and B.L. 6-inch C.P. Marks II and IV carriages.

"E," No. 3 is 11 inches long, for Q.F. 6-inch Mark II and B.L. 6-inch C.P. Marks II and IV carriages.

"H," No. 3 is 3 feet 3 inches long, for Q.F. 6-inch Mark II and B.L. 6-inch C.P. Marks II and IV carriages, also B.L. 6-inch C.P. Mark III A and B carriages.

The "carrier, battery box, No. 1" is for Q.F. 6-inch Mark II and B.L. 6-inch C.P. Marks II to IV carriages. The battery box, V, is supported on the sighting platform and a supporting plate is not required as with the Mark I carriage.

Shield (Plates X and XI).

This consists of a 6-inch steel plate, Y, having a curved front, tapered at each side; the front is cut away for the chase of the gun, to admit of 10 degrees depression, but, when necessary, may be cut locally, to allow up to 20 degrees, and the inside is also cut away to clear the sighting and elevating gears. The shield is supported by curved stays bolted to the under-carriage. There is a hole in the top edge, each side, for lifting loops.

Bridge, protecting sight.—See Mark I carriage, page 18.

The pedestal, levelling ring, holdfast, spanners and implements, are as for Mark I carriage, page 18; and the following are traversing, and cover, are provided:—

ARC, TRAVERSING, NO. 37, MARK I.

The arc is of metal, and is graduated into degrees which are subdivided into quarter degrees, the figures being on the lower part. It is secured to the top of the pedestal, and the angle of traverse is indicated by a pointer fixed to the carriage, *see* Indicator Gears.

COVER, CARRIAGE, 6-INCH, MARK II, B.L. C.P., AND Q.F. (MARK I).

This is of canvas, and is for protecting the carriage and breech of gun.

CARE AND PRESERVATION OF CARRIAGES.

See also "Regulations for Care and Preservation of War Matériel, &c."

Care must be taken when mounting carriages with a circular groove or ball "race" in the pivot not to injure the race. A cast iron protecting cap, to place on the pivot, is supplied to stations concerned.

The circular groove containing the anti-friction balls must be kept filled with mineral jelly to act as a lubricant and to prevent the ingress of water, and care must be taken before inserting the jelly to see that the groove and balls are perfectly clean and dry.

All sights must be carefully protected when putting on, or taking off, the carriage cover.

The cams of automatic sights will be protected by suitable covers which will be made locally.

Whenever any parts are found broken, defective, or deficient, which cannot be renewed by the artificer, fresh parts should be demanded at once. Any damage occurring at drill or practices should be at once reported with a view to its being made good without delay.

When the packing in the gland of the hydraulic buffer becomes worn, its pressure on the piston rod is lessened, hence leakage, and the metal gland must be screwed farther into the stuffing box; if this does not stop the leakage, the gland must be re-packed.

To Replace Packing of Hydraulic Buffer.—To give sufficient space to work at the glands it may be necessary to disconnect the cross-bar from the rods of running out springs and the gun from the hydraulic buffer, by removing the nuts *a*, *fig. 1*, and nuts *b* and *c*, *fig. 2*; the

Fig. 1.

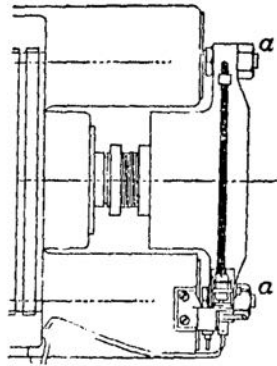
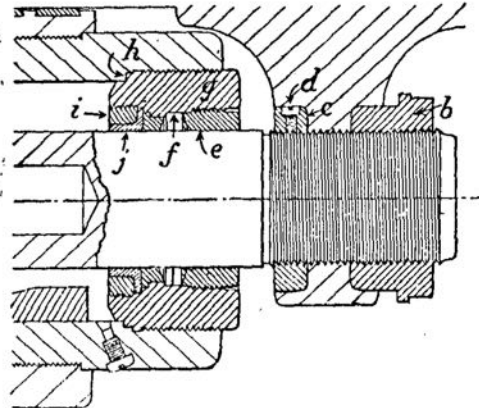


Fig. 2.



nut *b* is secured by a keep pin and nut *c* by a set screw *d*; this will allow the gun to be run back, which should be done with care (an apparatus is now provided for this purpose, *see* next page). Then pull out the piston rod a few inches, unscrew the outer gland *e*, and remove the old packing *f*. Clean out the stuffing box *g*, slightly coat it and piston rod with mineral jelly. Pack stuffing box with new cotton packing, which is $\frac{1}{2}$ -inch plaited, square in section; 36 inches will be required, which will be cut into lengths forming two rings, each about equalling the circumference of the piston rod; the cuts will be made diagonally, so as to overlap when the piece is formed into a ring; well tallow each ring, press them successively into the stuffing box with a piece of wood, or former, taking care that the joinings are well separated so as to break joint; screw home the gland, but not too tightly at first, which would prevent free action of piston rod. The bright parts should be coated with mineral jelly, and the gun connected up as previously.

To Replace Leather Washer, or "L" Leather.—The gun must be disconnected and placed in a convenient position as before mentioned. Empty the buffer by removing the plug of emptying hole and give air passage by releasing the filling hole plug on top of tank. Unscrew stuffing box *g* and move it to the rear, to allow the leather washer *h* to be taken out from the front, unscrew the metal ring *i* and take out the L leather *j*. The leathers are examined, and, if unserviceable, are removed from the piston rod with the glands; well dubbed new leathers are arranged with the metal ring and glands on piston rod, the glands being screwed up; connect up the gun as before, and fill the buffer as hereafter described.

To Replace Leather Washer of Tank Screw Plug, &c.—Run off about seven pints of oil as described for emptying the buffer, when the plug can be removed, and the washer replaced; screw in plug and refill buffer.

The leather washer of air plug will be replaced similarly, except that a little more oil must be run off, while to replace the leather washer of emptying plug the buffer must be emptied; but that of the filling hole can be replaced by simply removing the plug.

Controlling Plunger.—In cases where it is found that the guns do not run up to the front stops, a flat surface will be filed on the controlling plunger, or screw plug of controlling plunger, to allow of the gun running up to the stops without violence.

To Fill the Buffer.—Depress the gun and cradle, loosen the air plug and fill through the hole on top of tank at right side of cradle until the oil overflows through the air hole; replace the air plug and fill until the tank is full, then replace the filling hole plug after drawing off half a pint.

Contents, about 10 quarts of mineral oil.

APPARATUS, WITHDRAWING GUN FROM CRADLE.

No. 3, MARK I.—FOR CARRIAGES, GARRISON, B.L. 6-INCH, C.P. MARK I, AND Q.F. 6-INCH, MARKS I AND II.

This apparatus is of steel, and consists of a clip, bracket, and screw. The clip is placed over the lug on the rear end of the spring case; the bracket is secured to the crossbar connecting springs, and the screw connects the bracket and the clip. On turning the screw (if necessary, the nuts on the rods running out springs first being removed), the gun, with piston rod and crossbar, is drawn towards the rear in the gun cradle (without the aid of a working party), so as to facilitate the examination or re-packing of the glands and stuffing-box of the hydraulic buffer cylinder. If the stuffing-box is to be removed, the gun must, during the operation, be slightly depressed and blocked up, so as to prevent all possibility of its being run into elevation.

The sliding contact fittings on the spring case must be temporarily removed when using the apparatus, one of the screws of the contact fittings being used to secure the bracket of the apparatus in position.

The apparatus is made locally.

AMMUNITION.

See "Equipment Regulations for Actual Allowance."

CARTRIDGES.

CARTRIDGE, B.F. OR Q.F.C. 6-INCH SHORT, 13 LB. 4 OZ. CORDITE, SIZE 30.

(Plate XIII.)

Empty.

The empty cartridge, Mark III, is made of solid drawn brass to the form shown in the Plate. A hole is bored in the centre of the base, and screwed 14 threads per inch to receive the electric primer or the adapter. Three clips are formed at the mouth of the cartridge for retaining the lid in the cartridge, these clips being turned over the edge of the lid, and the joint sealed with cement.

Lid.

Mark I lid is made of white metal, and is for cordite or blank powder charges. The cap of the lid is weakened by having three concentric and six radial grooves in its outer surface to ensure its breaking up in the gun; it has also three notches in the rim, and the centre is recessed for the reception of the label detonating the method of filling. The interior of the lid is filled with a lubricating mixture consisting of equal parts of beeswax and tallow, a metal cover .02-inch in thickness being placed over this mixture and soldered to the cap, resin being used as a flux.

Filled Cartridge.

The filled cartridge contains a charge of 13 lb. 4 oz. of cordite, size 30, the method of filling being denoted by the numeral.

Mark VI.—One end of the charge is enclosed in a Mark II shalloon bag, which has a pocket at the bottom for the reception of a .2-inch cordite cylinder. The bag is secured to the charge by silk braid. An igniter of $1\frac{1}{4}$ oz. R.F.G.² powder in a shalloon bag is secured by sewing silk to the inside of the cordite cylinder.

Method of Filling this Mark.—First screw in an electric primer into the base of the empty cartridge; insert the charge so that the cordite cylinder is placed immediately over the primer; place on top of the charge a Mark II felt wad, which has a glazed board disc attached, and which is placed next the cordite; then fasten down the lid.

Mark VII differs from Mark VI in having the end of the charge enclosed in a Mark III shalloon bag, which differs from Mark II bag in the bottom and pocket for the cordite cylinder being made of silk cloth.

The cartridges are marked "cordite" in red on the lid, and are issued filled and fitted with electric primers, in boxes each of which holds four cartridges.

Filled cartridges will be stamped on the base with the letters "P" or "C" to denote that the cartridges are filled with either powder or cordite (powder still being used by Navy), and, in addition, with the letters "F" or "R" to denote that the charge is either a full or reduced one. When again filled, should the explosive used be the same as in the previous charge, it will only be necessary to add a small "F" or "R" to denote whether full or reduced. Should the explosive used be different to that in the previous charge, the letter "C" or "P" should be inserted before the small "F" or "R."

Empty cartridges must be cleaned immediately after firing, *see Regulations for Magazines, &c.*

The cases, when dry, are to be packed in the boxes in which they were supplied, and returned to store. The fired cartridges are on no account to be repacked in boxes containing unfired cartridges.

NOTE.—A powder cartridge for use with the paper shot is not yet provided.

CARTRIDGE, Q.F. OR Q.F.C., BLANK, 6-INCH, MARK III.

(Plate XIV.)

This cartridge consists of a brass case with primer, charge with igniter, paper cylinder, and lid.

The empty cartridge is the same as for service cartridges, previously described. The powder charge, consisting of 7 lb. blank L.G. is contained in a silk cloth bag, which is choked with sewing silk and looped with three silk braids passing under loops formed by four longitudinal strips of .35-inch braid stitched to the bag; this bag has a pocket in the bottom to take an igniter of $8\frac{1}{2}$ drams of R.F.G.² or new blank F.G. powder contained in a shalloon bag, secured in a perforated calico and paper dome stitched to the silk cloth bag. The charge is secured in the case by a paper cylinder (which is a hollow cylinder of brown paper, pierced with holes, with double discs secured to each end with glue and copper wire), and then the lid.

Cartridges of this description are marked in black on the lid, and are issued packed 4 in a box.

CARTRIDGE, DRILL, Q.F. OR Q.F.C. 6-INCH SHORT (WITH DUMMY PRIMER) (Plate XV).

Mark II.--This consists of a wood block weighted with lead to the weight of the service cartridge formed to resemble the cartridge case and fitted at each end with a brass cap; these caps are connected by a through bolt, and further secured by brass screws. The rear cap is formed like the base of the service cartridge, and screwed for the reception of a dummy primer.

Mark II*.--This is the Mark II altered by having the base flange milled, to facilitate handling the cartridge.

Mark III has the modification for Mark II*, and was to guide manufacture.

Mark IV differs from Mark III in having a central tube.

CARTRIDGE, DRILL, Q.F. OR Q.F.C., PRIMER, DUMMY.
BRASS, 12-PR. AND UPWARDS.

Mark III dummy primer is made of solid brass, to the same external shape as the service electric primer, with the exception of the head, which is polygonal. A disc of hard india-rubber is secured in the head so as to ensure insulation on release of the striker. It is stamped "dummy" on the head, and is used for drill purposes.

CARTRIDGE, Q.F. OR Q.F.C. PRIMER, ELECTRIC, LARGE.
(Plate XVI).

Mark IV* is a conversion of the earlier marks of primers, and consists of a body, ebonite insulator, contact disc, cone, copper wire connecting disc and cone, two poles, platinum wire bridge, cylinder, ebonite disc, screw collar, priming composition, and glazed board disc.

The *body* is of manganese-bronze. The head is milled and has two slots cut in it to fit the "keys, inserting and removing primers."

The body below the shoulder is screwed for a length of 0.8 inch to fit the cartridge. The end of the body is reduced in diameter for a length of 0.3 inch and screwed to receive the cylinder, the screw threads on the body and cylinder being coated with "Pettman" cement before screwing on the latter. The face of the body between the two screwed portions is cupped out for a depth of 0.25 inch to form a gas check. The head is recessed in the centre to receive the insulator and contact disc.

The inside of the body is turned out to the form shown in the Plate.

The *ebonite insulator* is screwed into the head of the primer, and the contact disc is held by an undercut groove in the ebonite.

The *contact disc* is of white metal, and is placed in the ebonite cup of insulator, which is then filled up with white metal, well pressed so as to expand the ebonite into its recesses; however, the contact disc is now of pure tin, instead of white metal, and primers so fitted are distinguished by having the letter "T" stamped on the head.

The *cone* is of brass insulated with oiled silk. The contact disc is connected to the centre of the cone by a piece of insulated copper wire, which is inserted and soldered into the disc and cone, and coiled as shown in the Plate; the cone being secured in position in the body by an ebonite washer and brass screw collar.

The *poles* are of crown metal, the larger one is fixed in the centre of the cone, and the smaller in the end of the body. A platinum-silver wire is soldered to the end of the centre pole, then stretched across

and soldered to the body pole with pure tin in each case, thus forming a single bridge, which is enveloped with guncotton yarn.

The *cylinder* is of brass, screwed inside at the top to fit over the end of the body, to which it is secured by a small set screw. It is recessed at the tapered end to take the glazed board closing disc, which is fixed and covered with "Pettman" cement.

The whole of the space round the centre pole and the inside of the cylinder is filled with priming composition, and is closed in the cylinder as before described.

Mark IV** differs from Mark IV* in having an iridic-platinum wire bridge (single bridge), the electrical resistance being from 0.75 to 0.95 ohm.

Mark V has the stronger wire bridge, described for Mark IV** primer, but differs otherwise from the latter in having the body pole bent slightly towards the centre pole (see Plate), and as all primers of this mark have contact discs of pure tin, the letter "T" will be omitted.

Filled cartridges are issued with primers in them. Spare primers are packed 10 in a tin cylinder, 20 cylinders being packed in a wooden box with lid attached by screws.

CARTRIDGE, Q.F. OR Q.F.C., ADAPTER.

(Plate XVII.)

The adapter is for use when the gun is fired by mechanical means. Mark I is made of hardened steel, similar in external form to the service electric primer, with the interior shaped to take the ordinary vent-sealing percussion tubes, and it has a fire hole in the bottom; this Mark is for future manufacture. The Mark II is shorter than the Mark I, and is screwed at the point; it will be used in any cartridges until the stock is exhausted.

IMPLEMENTS, FUZE SHELL AND CARTRIDGE. KEY, INSERTING PRIMER, ELECTRIC, Q.F. OR Q.F.C., LARGE. KEY, REMOVING, DITTO.

(Plate XVIII.)

These keys are made of mild steel to the form and dimensions shown on the Plate. They are used for inserting and removing the primers and adapters in the cartridge.

EXTRACTOR, CARTRIDGE, HAND, Q.F. OR Q.F.C., LARGE.

Mark I.—This extractor is made of steel, with a jaw at one end to grip the head of the electric primer when withdrawing the cartridge. The other end is flattened so as to fit under the forearm when the hand grasps the handle in the centre. It is 14.4 inches long.

BOXES, CARTRIDGE, Q.F., 6-INCH, LAND SERVICE.

Mark I box is made of deal, with elm ends. The sides and ends are dovetailed together, and the bottom is secured by brass screws. An elm cleat is fitted to the top and bottom of each end, and two vertical battens of deal are placed between the cleats to facilitate stowage. Each end of the box is fitted with a rope handle, which is attached to the top cleat.

The lid, which is zinc lined and fitted with two white-line handles, is secured by brass screws working in nuts let into the top of the box, and strengthened by two deal battens, each recessed to receive the end of the handles.

The box is fitted with an inside lining of zinc, and is made airtight by a luting joint formed in the lid. It will hold four cartridges,

two base up and two base down; the mouths of the cartridges fitting into recesses, and the primers into holes in the packing pieces, so as to prevent movement during transport. The packing pieces are 2 whole or 4 half, with springs, and when so fitted a (*) is added to the numeral of the box.

Mark II box differs from the previous Mark in being of teak or mahogany; and the lid is secured by means of four metal brackets, with wing nuts and studs let into the top of the box. The box has two packing pieces, and when spring packing pieces are supplied, the box is designated II*.

Mark III box is the Mark II* standard of make, and is for future manufacture.

Note.—In future packing pieces will be of paraffined desiccated teak or padouk, the mahogany packing pieces in existing boxes being exchanged as the boxes pass through the O.F. for repair.

Dimensions, &c.

Length over all, Marks I and II..	..	18.725 in.
Width " " " ..	..	17.125 "
Depth " " " ..	..	19.65 "
Weight, { Mark I " ..	..	54 lb.
{ Mark II " ..	..	67 lb.

Cartridges for Aiming-rifle and Aiming Tube (see Equipment Regulations).

CARTRIDGES, AIMING-RIFLE, 1-INCH, ELECTRIC.

The Mark II case is of solid-drawn brass, having in its base an electric primer made of three tubes, which fit into one another, the central and intermediate ones being insulated from one another by means of goldbeater skin round the body of the former, and a vulcanized fibre washer under its head. A platinum-silver bridge, round which is a tuft of guncotton, connects the ends of the central and intermediate tubes, the space beyond the bridge in the intermediate and outer tubes being filled with fine grain powder. A conical brass plug closes the mouth of the inner tube to prevent the escape of gas. The head of the inner tube is raised in the centre to form a contact point, and round it is a ring of insulating material. The case is charged with 400 grains R.F.G. powder, over which are placed wads, and a pointed bullet of hardened lead, secured to the case as for the percussion cartridge.

Mark IV., M. Mark IV, K.N. differ from Mark II in having an electric primer, consisting of a brass outer tube, two ebonite insulating plugs, and a brass contact pin. An aradio-platinum wire bridge is soldered, one end to the point of the contact pin, the other end to the circumference of the tube.

In order to facilitate identification of the pattern of primer used in the manufacture of Mark IV cartridges, the letters "M" or "K.N." are, in manufacture, stamped on the cartridge and printed on the wrapper after the numeral, to indicate that the primers are made, respectively, to the Morris, or King's Norton Company's pattern.

Packing, same as the 1-inch percussion cartridge.

CARTRIDGE, AIMING-RIFLE, 1-INCH, PERCUSSION.

Mark I, the case is of solid drawn brass, having the cap, chamber, and anvil formed in the base; the cap is double, the outer of brass, the inner of copper. Three fire holes in the cap chamber enable

the flash to pass from the cap to the charge. The charge consists of 465 grains of M.G.¹ powder, or 400 grains R.F.G.², on top of which are placed wads and the bullet. The bullet is of lead, pointed; it is secured to the case by indenting the latter in three places into the lower of three cannelures, but in latest manufacture the case is coned for the purpose of securing the bullet.

Packed 96 in a "Box, ammunition, S.A., G.S.," in bundles of 12. Weight of box, filled, about $97\frac{1}{2}$ lb.

CARTRIDGES, AIMING-TUBE.

Mark I case is of solid-drawn brass, with a cap chamber and anvil in the base; two fire holes in the anvil allow the flash to pass from the cap to the charge, which is $3\frac{1}{4}$ grains, "Curtis and Harvey's Diamond, No. 2" powder; over it are wads and a bullet of pure lead.

Mark II differs in the arrangement of the wads.

Packed 100 in a cardboard box, and issued, usually, 10,000 in a tin-lined box.

PROJECTILES. (LAND SERVICE.)

Nature.	Marks.	Bursting charge.		Weight, filled and fuzed in the case of shell.
		Weight.	Explosive used.	
Shell, B.L., Q.F., or Q.F.C., 6-inch—		lb. oz.		lb. oz.
Armour piercing {	I II, III	4 4 5 8	{ P.or Q.F. and F.G. }	100 0
Common, lyddite {	II III, IV	13 12 10 6	{ Lyddite {	102 4 101 2
Common, pointed* {	I II, III	7 7 1 3	{ P.or Q.F. and F.G. }	100 0
Shot, B.L., Q.F., or Q.F.C., 6-inch—				
Armour piercing*	I, II	—	—	100 0
Shell, Q.F. or Q.F.C. drill, 6-inch	II	—	—	100 0
Shot, solid. B.L., Q.F., or Q.F.C., 6-inch, iron practice	I	—	—	100 0
Shot, paper, empty, B.L. or Q.F., 6-inch	IV	—	—	120 0

* The existing stock of common pointed shell and armour piercing shot to be used up.

The bursting charges given above are P. or Q.F., and F.G. powder for armour piercing and common pointed shells, in the proportion of 2 lb. P. or Q.F. to 5 oz. F.G., and lyddite with an exploder for the lyddite shell.

SHELL, B.L., Q.F. OR Q.F.C., ARMOUR-PIERCING, 6-INCH GUN | C | .
(Plates XIX and XX.)

Mark II shell is of forged or cast steel without bands, with a pointed head, which is hardened for the penetration of armour plate, and is struck with a radius of two calibres. The total length of the shell is left to the manufacturer. The walls are .93 inch thick. The base is closed with a steel bush which is screwed in as tightly as possible and the joint rivetted up; this bush is tapped to take the "Fuze, percussion, base, large, No. 11." The groove for the driving band is undercut, and the driving band is of the gas check design.

The inside of the shell is lacquered, and to further prevent premature explosion when the gun is fired from the powder setting back in the shell, the bursting charge is contained in a dowlas bag, *see* page 35.

For bursting charge, &c., *see* table.

Mark III shell differs from Mark II in having waved ribs in the groove for the driving band; with these waved ribs the band is not so liable to turn, or strip off.

SHELL, B.L., Q.F. OR Q.F.C., COMMON LYDDITE, 6-INCH GUN | C | .
(Plate XXI.)

Mark II shell is made of forged steel, with a solid base, and it is fitted at the nose with a gun-metal socket which is tapped to G.S. gauge. It is fitted near the base with a gas check driving band, the groove for which is undercut, and the shell is varnished inside.

The bursting charge of lyddite, *see* table, has a $4\frac{1}{2}$ oz. picric powder exploder and a primer of 8 drams R.F.G.² powder, the explosion and primer are separately choked in a shalloon bag, and both are enclosed in a paper cylinder, the chokes being downwards; this cylinder is waterproofed and closed at the top with an aluminium cap, which is secured with shellac cement.

Mark III shell differs from Mark II in having thicker walls, and consequently a smaller bursting charge, *see* table.

Mark IV shell: In this pattern the groove for the driving band has waved ribs, *see* Plate XX A.P. Shell Mark III, with which the band is less liable to turn, or strip off; in other respects the shell is the same as Mark III.

*SHELL, B.L., Q.F. OR Q.F.C., COMMON POINTED, 6-INCH GUN.
(Plate XXII.)

The Mark I shell is of cast steel. Near the base a groove is turned, five ridges project on the groove, and twelve axial chisel marks are cut across the ridges to prevent the driving band turning on the shell.

The driving band is made of copper, and is pressed into the groove round the shell.

The head of the shell is pointed and struck with a radius of two diameters. A hole is bored in the base and screwed nine threads per inch left hand to receive the fuze or plug, the bottom of the hole being recessed to receive the flange of fuze or plug.

The Mark II shell differs from the Mark I only in having a gas check driving band.

Mark III has the groove for the driving band undercut.

* Existing stock of common pointed shell and armour-piercing shot to be used up.
(2516) C

When these shells are filled with powder, the charge is contained in a bag (*see* page 35), or when filled with salt for practice the word "salt" is stamped on the outside.

*SHOT, B.L., Q.F. or Q.F.C., ARMOUR-PIERCING, 6-INCH GUN.

(Plate XXIII.)

The Mark I shot is of forged steel, externally resembling the common shell except in the length, which is 17.3 inches. It has a core in order that it may be weighted up with small shot and sawdust if required. The base is closed with a screw plug, which is stamped with the letter W if the shell has been weighted up.

The Mark II is the same as the Mark I, with the exception of the driving band, which is of the same pattern as that described for the Mark II common pointed shell.

Drill and Practice Projectiles.

SHELL, Q.F. or Q.F.C., 6-INCH, DRILL.

(Plate XXIV.)

Mark II.—This shell is made of wood, brought up to the weight of the service projectile by a lead core. It is fitted with a bolt which passes through the centre of the shell and is screwed to a gun-metal nut, which forms the point of the shell. The base is protected by a gun-metal plate, and is recessed to receive the head of an extractor. Two copper bands are fitted to the shell to prevent injury to the rifling; the rear band is sufficiently large to prevent the shell being rammed too far.

SHOT, SOLID, B.L., Q.F. or Q.F.C., 6-INCH GUN | C |

IRON PRACTICE. (Plate XXV.)

This shot is made of iron, specially for practice purposes. It is 2.89 calibres long, with a head radius of 2 diameters. The shot is cast solid, with pointed head; the groove for the driving band has waved ribs, similar to the Mark IV lyddite shell; fitted in this groove is a driving band, with gas check; the front slope of the gas check portion is serrated, to prevent slipping.

SHOT, PAPER, EMPTY, B.L., or Q.F., 6-INCH | L |

WITH BUNG. (Plate XXVI.)

Mark IV consists of a pressed wood pulp cylinder, painted black, and having a filling hole in the base, closed with a bung. When required for use the shot is brought up to weight by being filled with a proportion of small shot and sawdust. The previous marks differ principally in being made of brown paper, or papier mâché.

Paper shot are stencilled "Not to be fired with cordite." They are for use during peace where service projectiles cannot be fired. The cylinders break up on firing, and the small shot with which they are filled only travel a short distance (about 200 yards), whilst the effect for purposes of testing recoil, &c., is practically the same as that with service projectiles.

* Existing stock of common pointed shell and armour-piercing shot to be used up.

BAGS, BURSTER, B.L., Q.F. or Q.F.C., 6-INCH $\left\{ \begin{array}{l} \text{ARMOUR PIERCING.} \\ \text{COMMON POINTED.} \end{array} \right.$

These are for holding the bursting charges of armour piercing and common pointed shells, to prevent premature explosion through friction when the powder sets back on the shock of discharge. The bags are made of dowlas, with shoulder and neck of shalloon, and choked with twine, the shape corresponding with the interior walls of the shell.

PLUGS, BASE, SHELL $\left\{ \begin{array}{l} \text{No. 1.} \\ \text{No. 4.} \end{array} \right.$

No. 1 base plug is made of gun-metal, and is of the same external shape as the fuze, but with a square keyhole in the head to take the "Wrench, base, plug."

The plug is used for filled shells taking the large base fuze, B.L. or Q.F. 6-inch, and above.

No. 4 base plug is of gun-metal, made specially for empty pointed shells, B.L., Q.F. or Q.F.C. 6-inch and above, and must not be used in shells filled with powder.

PROTECTOR, PROJECTILE, NO. 8.

The protector is for use with the 6-in. B.L., B.L.C., Q.F., and Q.F.C. pointed projectiles. It consists of an elm block which is recessed to receive the point of the projectile and fitted with an iron or steel band to receive the screwed end of an adjustable band of hoop iron, the latter band is in two pieces, bent and rivetted at the bottom to a dish-shaped plate which fits over the base of the projectile.

It can be lengthened or shortened to a certain extent by means of the hooped band, by engaging the studs in corresponding slots, and then finally tightened up on the projectile with the nuts on the screwed portions of band.

STRIPS, AUGMENTING, B.L., Q.F. or Q.F.C., 6-INCH.

Augmenting strips are intended to be used with B.L. and Q.F. projectiles (except with driving bands with gas check, to such bands the strips must not be fitted) in cases when the rifling of the gun has, owing to erosion, become so worn that the gun ceases to properly rotate its projectiles. The strips are of copper, of even section throughout, and grooved on one side.

Method of Insertion.—The top cannellure in the driving band is to be undercut all round on both sides by means of a special chisel supplied for the purpose (cannelures are now undercut during manufacture, and the shell marked with a U on the driving band). The augmenting strip is then inserted in the cannellure, grooved side of strip inwards, and lightly hammered until the two tongues of metal formed by the groove on the inner side of the strip are dovetailed into the undercuts in the cannellure.

If the gun is very much worn, and one strip is found insufficient to impart the proper rotation, a second may be inserted in lower cannellure, in addition, *i.e.*, in bands having more than one cannellure.

EXTRACTOR, DRILL SHELL, No. 4 (MARK II).

STEEL, LENGTH 3 FEET 11·6 INCHES, Q.F. OR Q.F.C. 6-INCH TO 4-INCH;
ALSO B.L. 6-INCH, ALL MARKS NAVAL, AND MARKS VII AND VII^V
LAND SERVICE.

Mark II extractor is a steel bar, 0·625 inch diameter, and 47·6 inches long, having at one end a T-shaped handle 5·5 inches long, and at the other a T-shaped projection to fit the slot in the recess of base of the drill shell.

Mark I extractor was 43·6 inches long, otherwise it was the same as Mark II.

DISTINGUISHING MARKS.

INSTRUCTIONS FOR FILLING SHELLS; FIXING PLUGS AND FUZES, AND
SECURING FUZES; TRANSPORT AND STORAGE.

(See "*Regulations for Care and Preservation of War Matériel, Magazines, &c.*")

FUZES.

Percussion { Base, large, No. 11.
Direct-Action, Impact, No. 13.

DRILL, PERCUSSION, { Base, large, No. 11.
D.A., impact.

The actual equipment allowed of the above will be found in the
"Equipment Regulations."

The following is a description of the fuzes :—

FUZE, PERCUSSION, BASE, LARGE, No. 11.

(Plate XXVII.)

This fuze is for use in steel shell, having pointed heads.

Mark II consists of the following parts, viz.:—Body, needle, pellet, centrifugal bolt, pressure plate with spindle and nut, screwed cap with detonator and plug, phosphor bronze spring, brass spring, lead washer, and four brass screws.

The body of the fuze is of manganese bronze, screwed outside (left hand), to fit the shell. The pressure plate is of copper, and is spun into the base of the fuze; it carries a spindle which retains the centrifugal bolt in the needle pellet by engaging in a slot in the latter until the pressure plate is blown in. The base of the body is recessed to admit of the pressure plate being forced in by the gas pressure when the gun is fired.

The needle pellet is of gun-metal, and has a screwed recess on top for the needle plug, and a hole bored in it, at right angles to the axis, to take the centrifugal bolt, the head of which engages into a recess in the side of the body, and is kept in that position by a spiral brass spring in the opposite side, and by the spindle of the pressure plate. The needle pellet is prevented from working forward in flight by a spiral spring of phosphor bronze.

The detonator is spun into a recess in the screwed cap, and communicates by six fireholes with the magazine containing a compressed pellet of R.F.G.² powder between the cap and the plug.

Action.—On discharge, the pressure of the gas crushes in the pressure plate, causing the spindle to release the centrifugal bolt, the

rotation of the shell causes the centrifugal bolt to be spun out, compressing the spring in rear, and leaving the needle pellet free to move forward on impact; when the needle strikes the detonator, the flash ignites the powder pellet in the magazine, and explodes the shell.

The head is painted red.

Mark I differs from Mark II:—(a) in having the shoulder under the pressure plate stouter, and consequently offering greater resistance to the plate; (b) the magazine contains loose M.G.' powder. The dimensions slightly differ also.

Packed one in a tin cylinder.

Weight 2 lb. 8 oz.

NOTE.—Shells fitted with this fuze must never be placed point to base.

FUZE, PERCUSSION, DIRECT-ACTION, IMPACT, No. 13.

Mark I.—This is a nose fuze for the lyddite shell; the body is of gun-metal, 2.2 inches long, screwed on the outside to G.S. gauge, the upper part being turned and furnished with a small projection on each side to receive a cap; the latter was formerly of steel, but now it is of manganese bronze with safety pin; the rim of the cap has a T-shaped cut on each side to lock on to the projections on the body, and there is a square key hole in the top for fixing the fuze in the shell.

The fuze is made waterproof as much as possible by having a disc of foolscap paper cemented on over the head, which is, with all openings made in the body, painted over with Pettman cement.

On the fuze passing through the R.L., it has been altered to agree as nearly as possible with Mark III, and then designated Mark I*, and so stamped.

Mark II was designed for R.M.L. high angle lyddite shell.

Mark III.—This Mark differs from Mark I in having additional arrangements in the head, with a view to the exclusion of damp.

Marks I*, II, and III fuzes are brought up to Mark IV pattern, as nearly as possible, when passing through the R.L. for repair, and when so altered they are stamped thus:—I**, II*, III*.

Mark IV is for future manufacture.

The safety pin and cap have to be removed before loading.

Weight of fuze 10 ozs.; weight of cap 3 oz.

DRILL FUZES.

Fuze, drill, percussion, base, medium, No. 11.—Service fuzes which have been burned out will, as far as possible, be utilized for this purpose by being cleaned and refitted with empty screwed cap and plug, bronzed, and stamped "DRILL."

Fuze, percussion, D.A., impact, drill.—This drill fuze is generally similar in external appearance to the service fuze. It consists of a hollow body, removable cap, and steel split safety pin, which can be withdrawn and replaced as required; it is stamped "DRILL," and intended for use with the drill lyddite shell.

TUBES.

TUBES, VENT-SEALING, PERCUSSION.

(Plates XXVIII and XXIX.)

Mark IV.—This consists of a body, anvil, striker, brass washer, percussion cap, copper washer, two paper discs, and a cork plug. The body is made of brass, solid drawn; a hole is drilled through the

head to receive the striker, which is secured in position by being riveted into the countersunk washer, as shown in the Plate. The upper part of the chamber is screwed and fitted with an anvil, on which is placed the percussion cap, the upper surface of which is in contact with the striker; a small central and two diagonal fire-holes are drilled through the anvil. The remainder of the space in the tube is filled with loose pistol powder, and the bottom is closed with a paper disc and cork plug coated with varnish.

Action.—This is the same as Mark VI tube, excepting that the striker of the tube, together with the percussion cap, is driven on to the anvil, thus firing the tube.

Mark V tube differs from Mark VI in the form of the striker, which is without the cup-shaped gas check, and the detonator, which is held in position by a brass screwed collar. The tube is filled with R.L.G.² powder, the interstices being filled up with R.F.G.² powder, but in latest manufacture a special fine grain powdered (those filled on or before 14th December, 1899, were filled with pistol powder); it is closed with a paper disc, and cork plug coated with varnish.

This Mark will be used up for drill and instructional purposes only.

Mark VI tube consists of a body, detonator, detonator holder, two washers, shearing wire, two paper discs, and cork plug.

The body is of solid drawn brass, the head is bored centrally for the striker, detonator, and fire channel. The striker is of brass with a needle point, and a plain flange at its base, under which is fitted a copper cup-shaped gas check; and it is held in position by a copper shearing wire passed through the tube, and a brass washer in the recessed head of the tube. The detonator is fitted into the holder, and the latter is screwed into the body of the tube. Under the detonator holder is a copper washer and a disc of fine white paper. The lower part of the tube is filled with R.F.G.² powder siftings, or else a special fine grain powder (present manufacture). The tube is closed with a paper disc and cork plug, which is coated with varnish.

Action.—On firing the gun the point of the gun striker drives the striker of the tube on to the detonator, thus firing the tube, the flash passing on to the charge.

Mark VII generally differs from Mark VI in having an anvil cast solid with the body, a copper percussion cap, and a manganese bronze striker with blunt point.

The head of the tube is bored out to receive the cap and a screw plug with striker. There is a recess round the anvil for the reception of the cap, and three fire holes give passage to the flash. The cap is secured in position over the anvil by the screw plug, which is made in two parts, and contains the striker, the latter being kept clear of the cap by the usual copper shearing wire.

The action is similar to that mentioned for Mark IV.

These tubes are packed 10 in a tin box.

TUBE, VENT-SEALING, PERCUSSION, DRILL.

(Plate XXVIII.)

This tube is made of gun-metal, the interior being bored out, and the head fitted to receive the coned indiarubber plug as shown in the Plate. The lower portion is closed by a gun-metal plug.

RANGE TABLE for 6-inch Q.F. Guns, Marks I to III.

Based on Practice of 29.12.92, 6.4.93, 10.4.93.

Minutes, 32.563, 33,310II.

Fuze Scale based on practice of 10.12.96. Minutes 42.787III, 43,361V.

Charge,	weight, 13 lb. 4 oz.	Muzzle velocity, 2,154 f.s.	73
	gravimetric density, $\frac{55.01}{0.504}$		4
	nature, cordite, size 30.		2019
Projectiles,	nature, Palliser shot,	Nature of mounting, pedestal.	40185
	shrapnel shell		9552
	weight, 100 lb.		
		Jump, nil.	

Remaining velocity.	To strike an object 10 feet high, range must be known within	Angle of descent.	5 minutes' elevation or depression alters point of impact.		ELEVATION.	Range.	Fuze scale for T. and P. middle, No. 54, Marks I*, II, or III.	50 per cent. of rounds should fall in			Time of flight.	Penetration into wrought iron.
			Range.	Laterally or vertically.				Length.	Breadth.	Height.		
f.s.	yards.	°	yards.	yards.	°	yards.		yards.	yards.	yards.	secs.	ins.
2122	1145	0 5	125	0.14	0 4	100	1	...	0.4	...	0.16	13.4
2091	635	0 9	125	0.29	0 9	200	1	...	0.4	...	0.31	13.2
2061	404	0 14	125	0.43	0 13	300	1	...	0.4	...	0.47	13.0
2032	316	0 18	125	0.58	0 17	400	1	...	0.4	...	0.62	12.0
2003	260	0 22	125	0.72	0 21	500	1	...	0.5	0.2	0.78	12.6
1974	211	0 27	125	0.87	0 26	600	2	...	0.5	0.2	0.95	12.4
1946	183	0 31	125	1.01	0 30	700	2	...	0.5	0.2	1.11	12.2
1909	163	0 35	125	1.16	0 34	800	2	...	0.5	0.2	1.28	12.2
1883	143	0 40	125	1.31	0 39	900	3	...	0.6	0.3	1.44	11.8
1857	130	0 44	125	1.45	0 43	1000	3	...	0.6	0.3	1.61	11.6
1830	118	0 48	125	1.60	0 47	1100	3	...	0.6	0.3	1.78	11.4
1803	110	0 52	125	1.74	0 51	1200	4	...	0.6	0.3	1.95	11.2
1776	101	0 56	125	1.89	0 55	1300	4	...	0.7	0.4	2.12	11.0
1749	93	1 1	125	2.03	0 59	1400	4	...	0.7	0.4	2.30	10.8
1722	86	1 6	125	2.18	1 3	1500	5	...	0.7	0.4	2.47	10.6
1695	80	1 12	125	2.32	1 7	1600	5	25	0.8	0.5	2.65	10.5
1669	71	1 19	125	2.47	1 11	1700	5	25	0.9	0.5	2.84	10.3
1642	67	1 26	100	2.61	1 16	1800	6	25	1.0	0.5	3.03	10.1
1616	61	1 33	100	2.76	1 22	1900	6	25	1.1	0.6	3.23	9.9
1591	57	1 40	100	2.91	1 27	2000	7	25	1.2	0.6	3.41	9.7
1567	53	1 48	100	3.05	1 32	2100	7	25	1.3	0.8	3.60	9.5
1544	50	1 56	100	3.21	1 37	2200	7	25	1.4	0.9	3.80	9.4
1522	47	2 4	100	3.34	1 42	2300	8	26	1.5	1.0	4.0	9.3
1501	43	2 13	160	3.49	1 47	2400	8	26	1.6	1.1	4.20	9.1
1480	40	2 23	160	3.63	1 53	2500	9	26	1.7	1.2	4.40	9.0
1459	39	2 32	100	3.78	1 58	2600	9	26	1.8	1.3	4.60	8.8
1439	35	2 42	80	3.92	2 4	2700	9	27	1.9	1.4	4.80	8.6
1419	33	2 52	80	4.07	2 11	2800	10	27	2.0	1.5	5.0	8.5
1399	31	3 3	80	4.21	2 17	2900	10	27	2.1	1.6	5.22	8.4
1380	30	3 14	80	4.36	2 24	3000	11	27	2.2	1.7	5.45	8.2

RANGE TABLE for 6-inch Q.F. Guns, Marks I to III—*continued*.

Remaining velocity.	To strike an object 10 feet high, range must be known within	Angle of descent.	5 minutes' elevation or depression alters point of impact		ELEVATION.	RANGE.	Fuze scale for T. and P. middle, No. 84, Marks I, II, or III.	50 per cent. of rounds should fall in			Time of flight.	Penetration into wrought iron.
			Range.	Laterally or vertically.				Length.	Breadth.	Height.		
f.s.	yards.	° ' "	yards.	yards.	° ' "	yards.		yards.	yards.	yards.	secs.	ins.
1361	23	3 26	80	4 51	2 31	3100	11½	28	2 4	1 8	5 67	8 1
1342	27	3 38	80	4 45	2 39	3200	12	28	2 5	1 9	5 90	8 0
1324	25	3 50	80	4 40	2 45	3300	12½	28	2 5	2 0	6 12	7 8
1305	23	4 2	70	4 34	2 52	3400	13	28	2 5	2 1	6 35	7 7
1286	21	4 15	70	5 09	2 59	3500	13½	29	2 5	2 2	6 57	7 6
1267	21	4 28	70	5 23	3 6	3600	14	29	2 5	2 3	6 8	7 5
1248	20	4 42	63	5 38	3 14	3700	14½	29	2 4	2 4	7 04	7 4
1230	20	4 56	63	5 52	3 23	3800	15	29	2 4	2 5	7 28	7 3
1213	18	5 10	63	5 67	3 31	3900	15½	29	2 4	2 6	7 53	7 2
1198	17	5 25	63	5 81	3 39	4000	16½	30	2 4	2 7	7 78	7 1
1182	17	5 41	63	5 96	3 47	4100	16½	30	2 3	2 9	8 03	7 0
1166	16	5 57	63	6 11	3 56	4200	17½	30	2 3	3 2	8 28	6 9
1150	15	6 13	63	6 25	4 4	4300	18	30	2 2	3 6	8 55	6 8
1134	15	6 30	63	6 40	4 13	4400	18½	31	2 3	4 0	8 82	6 7
1118	14	6 46	57	6 54	4 21	4500	19½	32	2 3	4 5	9 09	6 6
1103	13	7 2	56	6 69	4 30	4600	19½	34	2 4	5 0	9 36	6 6
1089	13	7 19	55	6 83	4 38	4700	20½	36	2 5	5 5	9 63	6 5
1076	12	7 36	54	6 98	4 47	4800	21½	40	2 7	6 0	9 90	6 4
1064	11	7 53	53	7 14	4 56	4900	21½	44	3 0	6 5	10 18	6 4
1052	11	8 10	52	7 27	5 5	5000	22½	48	3 5	7 0	10 46	6 3
1040	11	8 27	51	7 42	5 14	5100	23½	52	4 0	7 5	10 74	6 3
1028	10	8 44	50	7 56	5 23	5200	24	57	4 5	8 0	11 02	6 2
1016	10	9 1	49	7 71	5 32	5300	24½	59	5 0	8 5	11 31	6 1
1004	10	9 18	48	7 85	5 41	5400	25½	61	5 6	9 0	11 60	6 0
992	10	9 36	47	8 00	5 50	5500	26½	63	6 1	9 6	11 89	5 9
980	10	9 54	46	8 14	6 0	5600	27	64	6 5	10 3	12 18	5 9
968	9 5	10 13	45	8 29	6 10	5700	27½	65	6 9	11 0	12 47	5 8
956	9 0	10 32	43	8 43	6 20	5800	28½	65	7 0	11 7	12 76	5 8
944	8 5	10 51	42	8 58	6 31	5800	29½	65	7 1	12 4	13 08	6 7
932	8 3	11 10	41	9 13	6 42	6000	30	65	7 1	13 0	13 39	5 6
920	8 3	11 29	39	9 27	6 54	6100	...	65	7 1	13 5	13 70	5 6
908	8 2	11 48	38	9 41	7 7	6200	...	65	7 2	14 0	14 02	5 5
896	8 2	12 10	37	9 56	7 18	6300	...	65	7 2	14 5	14 35	5 5
884	7 5	12 32	36	10 10	7 30	6400	...	65	7 2	15 0	14 69	5 5
872	7 3	12 58	36	10 25	7 43	6500	...	65	7 3	15 5	15 03	5 4
860	7 0	13 18	35	10 40	7 56	6600	...	65	7 3	16 0	15 38	5 3
849	6 8	13 42	35	10 54	8 9	6700	...	66	7 4	16 5	15 73	5 3
838	6 7	14 6	34	11 8	8 23	6800	...	66	7 4	17 0	16 08	5 3
828	6 6	14 32	34	11 22	8 47	6900	...	66	7 5	17 5	16 44	5 2
819	6 4	14 58	33	11 36	8 51	7000	...	66	7 5	18 0	16 80	5 2
810	6 2	15 25	33	11 50	9 5	7100	...	66	7 6	18 5	17 16	5 1
801	6 0	15 52	33	12 4	9 20	7200	...	66	7 6	19 0	17 52	5 1
794	5 8	16 19	33	12 18	9 35	7300	...	66	7 7	19 5	17 88	5 0
788	5 6	16 46	33	12 42	9 50	7400	...	66	7 7	20 0	18 25	5 0
780	5 5	17 13	33	13 6	10 5	7500	...	66	7 8	20 5	18 62	5 0
773	5 4	17 40	32	13 30	10 20	7600	...	67	7 8	21 0	19 00	4 9
766	5 3	18 8	32	13 54	10 35	7700	...	67	7 9	21 5	19 37	4 9
759	5 3	18 7	32	14 18	10 50	7800	...	67	7 9	22 0	19 75	4 9
753	5 2	19 6	32	14 42	11 6	7900	...	67	8 0	22 5	20 12	4 8
747	5 1	19 36	32	15 6	11 21	8000	...	67	8 0	23 0	20 50	4 8

RANGE TABLE for 6-inch Q.F. Guns, Marks I to III—*continued.*

Remaining velocity.	To strike an object 10 feet high, range must be known within	Angle of descent.	5 minutes' elevation or depression alters point of impact		ELEVATION.	RANGE.	Fuze scale for T. and P. Middle No. 54, Marks I*, II, or III.	50 per cent. of rounds should fall in			Time of flight.	Penetration into wrought iron.
			Range.	Laterally or vertically.				Length.	Breadth.	Height.		
f.s.	yards.	° ' "	yards.	yards.	° ' "	yards.		yards.	yards.	yards.	secs.	ins.
741	5.1	20 5	31	11.77	11 37	8100	...	67	8.0	23.7	20.88	4.7
735	5.0	20 31	31	11.92	11 52	8200	...	67	8.0	24.5	21.26	4.7
729	5.0	21 3	30	12.07	12 7	8300	...	67	8.0	25.3	21.64	4.7
723	4.9	21 33	30	12.22	12 22	8400	...	68	8.1	26.1	22.02	4.6
717	4.8	22 3	30	12.36	12 39	8500	...	68	8.1	26.9	22.40	4.6
711	4.6	22 33	30	12.50	12 54	8600	...	68	8.1	27.7	22.78	4.6
706	4.5	23 3	30	12.65	13 9	8700	...	68	8.1	28.5	23.16	4.5
701	4.4	23 33	29	12.80	13 25	8800	...	68	8.2	29.3	23.55	4.5
697	4.3	24 3	29	12.94	13 41	8900	...	68	8.2	30.1	23.93	4.4
693	4.2	24 33	28	13.08	13 58	9000	...	68	8.2	30.9	24.31	4.4
690	4.1	25 3	27	13.23	14 14	9100	...	68	8.2	31.7	24.69	4.4
687	4.0	25 33	27	13.37	14 31	9200	...	68	8.3	32.5	25.07	4.3
684	3.9	26 3	27	13.52	14 48	9300	...	68	8.3	33.3	25.45	4.3
681	3.8	26 33	27	13.66	15 6	9400	...	68	8.3	34.1	25.83	4.3
679	3.7	27 3	26	13.81	15 24	9500	...	69	8.3	34.9	26.21	4.2
676	3.6	27 33	26	13.96	15 42	9600	...	69	8.4	35.7	26.60	4.2
673	3.5	28 3	26	14.11	16 0	9700	...	69	8.4	36.6	26.98	4.2
670	3.5	28 33	25	14.26	16 19	9800	...	69	8.4	37.5	27.36	4.1
667	3.3	29 4	25	14.40	16 34	9900	...	69	8.4	38.4	27.74	4.1
664	3.3	29 35	25	14.55	16 57	10000	...	69	8.4	39.3	28.12	4.0
661	3.3	30 6	25	14.70	17 17	10100	...	69	8.5	40.2	28.51	4.0
658	3.2	30 39	25	14.84	17 34	10200	...	69	8.5	41.1	28.90	4.0
656	3.2	31 9	25	14.99	17 58	10300	...	69	8.5	42.0	29.29	3.9
654	3.2	31 40	24	15.13	18 19	10400	...	69	8.5	42.9	29.68	3.9
652	3.1	32 12	24	15.28	18 40	10500	...	69	8.5	43.8	30.06	3.9
650	3.1	32 44	24	15.42	19 2	10600	...	69	8.6	44.7	30.44	
648	3.1	33 16	23	15.57	19 23	10700	...	70	8.6	45.6	30.82	3.8
646	3.0	33 48	33	15.71	19 45	10800	...	70	8.6	46.5	31.20	3.8
644	3.0	34 21	23	15.86	20 7	10900	...	70	8.6	47.4	31.58	3.7

1st July, 1902.

RANGE TABLE for 1-inch Aiming Rifle.

71
1
161

Based on Practice of 25.6.00.

Minute 49,629 (a) and (b),

AMMUNITION, ELECTRIC, AIMING-RIFLE, MARK IV, M. OR K.N., OR
PERCUSSION, MARK I.

Muzzle velocity, 1,100 f.s.

Slope of descent.	5 minutes' elevation or deflection alters point of impact.		ELEVATION.	RANGE.	50 per cent. of rounds should fall in.		
	Range.	Vertically or laterally.			Length.	Breadth.	Height.
1 in	yards.	yards.	° "	yards.	yards.	yards.	yards.
343	31	0.14	0 16	100			
149	31	0.29	0 32	200			
90	30	0.43	0 48	300			
61	30	0.58	1 4	400			
45	29	0.72	1 21	500			
35	29	0.87	1 38	600	10.0	0.36	0.30
28	28	1.01	1 55	700	10.3	0.38	0.40
23	27	1.16	2 12	800	10.7	0.40	0.52
19	27	1.31	2 30	900	11.2	0.43	0.64
16	26	1.45	2 49	1000	11.8	0.46	0.78
14	25	1.60	3 9	1100	12.5	0.50	0.94
12	25	1.74	3 30	1200	13.2	0.55	1.12
10	24	1.89	3 52	1300	13.9	0.61	1.32
9	23	2.03	4 15	1400	14.7	0.69	1.56
8	22	2.18	4 38	1500	15.6	0.77	1.84
6	21	2.32	5 1	1600	16.6	0.87	2.16
7	20	2.47	5 25	1700	17.7	0.98	2.53
6	19	2.61	5 50	1800	18.9	1.10	2.96
6	18	2.76	6 16	1900	20.1	1.23	3.44
5	18	2.91	6 43	2000	21.4	1.37	3.97
5	18	3.05	7 10	2100	22.7	1.53	4.55
5	17	3.20	7 38	2200	24.0	1.70	5.20
4	17	3.34	8 6	2300	25.3	1.87	5.90
4	17	3.49	8 34	2400	26.6	2.05	6.64
4	17	3.63	9 2	2500	28.0	2.25	7.40

NOTE.—When firing over water at 1,000 yards range the bullets ricocheted about 1,200 yards more, coming to rest at a range of about 2,200 yards.

16th October, 1900.

DRILL FOR 6-INCH Q.F. GUNS.

The Gun Detachment consists of a Gun Captain, Gun Layer, and eight other gun numbers. It falls in and is told off in the usual manner. For the duties of Gun Captain and Gun Layer, see Garrison Artillery Training.

AMMUNITION SUPPLY.

Cartridges are supplied from recesses (or depôts if required) in the emplacement, and thence by hand to the gun platform. A proportion of these should be prepared for percussion firing, before action. Supply may also be made to the level of the emplacement by lift.

Projectiles are supplied from recesses in the emplacement and from depôts, which should be arranged round the gun platform under cover of the parapet. Supply may also be made to the level of the gun platform by lift.

The normal supply of ammunition will be from the recesses and depôts; in this case 6 and 8, working alternately, supply 3 with cartridges, and 7 and 9 lift projectiles on to the gun platform for 5. This supply must be made intelligently, as the gun is traversed, from the most convenient recess or depôt.

When supply is from lifts, 6 and 8 will work in a similar manner, keeping 3 supplied by the shortest way; 5 and 7 pick up and load shell alternately, and 9 goes below to assist the ammunition detail.

Empties will be stacked by 6 and 8 without obstructing the working numbers at the gun.

As the recesses only hold a limited number of rounds, it will be advisable not to reduce the total for each gun below 12, and when this point has been reached, to change to lift supply.

In addition to the above detail, when guns are served by lifts direct from both shell and cartridge stores, six additional numbers will be required, to supply and work the lifts.

TO PREPARE FOR ACTION.

Gun Group Commander.	Gun Captain.
"A Group,	"A 1,
Prepare for action."	Prepare for action."

At this order stores are brought up as follows:—

Gun Group Commander.—Gauge protrusion striker.

Gun Captain.—A piece of chalk.

Gun Layer.—Sights, striker, firing battery (if not already on the mounting), screwdriver, and box of spare parts and tools (if required).

2.—Cartridge extractor, McMahon spanner, wrenches for breech mechanism and buffer, oil can, and waste.

3.—Tubes, tube box, lanyard, and an empty cartridge case with primer.

4.—Rammer.

5.—Assists the Gun Layer.

6 and 8.—Keys of cartridge and shell recesses; 1 key, inserting primers; 1 key, removing primers, and 1 cartridge holder. For drill, a drill cartridge, adapter, and drill tube.

7 and 9.—Brush; 2 keys, fuze, universal; 2 keys, base fuze and plug (when required), and grease box. For drill, a drill shell, and shell extractor.

The following Group Stores will be brought up, and such others as are considered necessary locally :—

Hammers, claw, 1 per group.

Clinometer, 1 per sub-district.

Whistles, 1 per group.

The G.G.C. will personally test the protrusion of the striker of all the guns in his group, with the breech open and the lever in the closed position. When the lever is in the open position, he will see that the point of the firing pin is within the face of the breech screw; he will also examine the nuts on the sheath and those on the striker needle to see that they are properly tightened up.

The Gun Captain will satisfy himself that the buffer is properly connected up, not leaking at the gland, and contains the correct amount of oil, that the capsquares are properly secured, and that the lubricators on the top of the cradle are filled with oil. When the breech is opened, he looks to see that the bore is clear.

The Gun Layer fixes the sights in the cradle, sees that they fit and work properly, and that the sight brackets and carriers are firmly attached to the mounting; tests, and if necessary adjusts the automatic sight, attaches the firing battery to the mounting (if not already on), makes the necessary connections, and tests the firing circuit. At night he sees that the leads for illuminating sights are properly connected, and that the lamps are in good working order. He sees that the elevating and traversing gear is oiled and in good order.

3 removes the breech and muzzle covers, straps the tube box round his waist, and loads an empty cartridge case fitted with an electric primer as soon as the breech is opened.

2 places the loop of the cartridge extractor over his left wrist and opens the breech by grasping the lever with his right hand and pulling it towards him as far as it will come; this unlocks and withdraws the breech screw; he then examines the breech screw and threads of the breech, sees that they are clean and free from burrs, and lubricates the threads with a slight film of oil.

4 places the rammer in a convenient position for use and assists the layer.

6 and 8 go to the recesses, or head of cartridge lift, and prepare to issue cartridges. For drill they place the drill cartridge in a convenient position for use.

7 and 9 go to the shell depôts, or recesses (or shell lift and shell store if supply is by the lift) and prepare shell for loading, *i.e.*, clean and fuze them and remove safety pins. For drill, they place the drill shell and extractor in a convenient position for use.

The safety arrangements of the gun can now be tested under the superintendence of the G.G.C. as follows :—He will direct the Gun Layer to keep the trigger firmly pressed, while 2 closes the breech, by pushing the lever from him with his left hand, until the breech screw is locked. In this position the primer should not fire, as the safety stop is still holding the striker back. The final movement of the lever and safety stop, in fully closing the breech, should fire the primer.

2 then opens the breech, extracts the empty cartridge case, using the extractor with his left hand, and closes the breech again.

Each number will report to the Gun Captain regarding any damage or deficiency.

After each number has completed his work, he takes post as follows :—

Gun Captain in the most convenient position.

Gun Layer on the sighting step.
 2 on the right of the gun facing the breech.
 3 on the left of the gun facing the breech.
 4 on the left of 2.
 5 on the right of 3.
 6, 7, 8, 9, as above detailed.

TO LOAD.

Gun Group Commander.		Gun Captain.
"A Group,		"A 1,
.....Load."		.....Load."

Electric Firing.—2 opens the breech, extracts the cartridge case (if one is in the bore), and lays it down.

7 or 9 supply 5 with the projectile, fuze, and with safety pin removed, 5 places it in the bore.

4 picks up the rammer, and assisted by 5 rams home in one motion.

4 withdraws the rammer, and retains it in his hand.

(Note.—When using Lyddite shell the safety pin only will be removed by 7 or 9; the cap will be removed by 2, just before the shell is placed in the bore).

6 or 8 supply a cartridge to 3, who places it in the bore.

2 closes the breech as follows: Grasping the handle of the extractor to prevent it swinging about, he pushes the lever from him with his left hand as far as it will go, being careful to see that 3's hand is clear before closing; when all are clear of recoil, he gives the word "A 1 ready," sufficiently loud for his own layer to hear.

When supply is from the lift, 5 or 7 receives the shell at the head of the lift, prepares it, places it in the bore, and assists 4 to ram home.

Percussion Firing.—As above, with the following exceptions:—After 3 has entered the cartridge with adapter, but with no tube, 2 closes the breech, to ascertain that the charge is home, then opens the breech carefully so as not to work the extractor, and when 3 has put in the tube, closes it carefully to avoid jarring the tube. He then cocks the striker, by pulling it to the rear till caught by the trigger, 3 attaches the lanyard, and stands ready to fire, 2 gives the word "A 1 ready," when all clear of recoil.

TO LAY AND FIRE.

- | | | |
|---|---|---|
| 1. Auto-sights—
(a) Electric firing
(b) Percussion firing
2. Rocking bar sights—
(a) Electric firing
(b) Percussion firing | } | See General Instructions, Garrison
Artillery Training. |
|---|---|---|

The normal method of laying will be by auto-sights; should these be disabled, or the target be beyond their effective range, rocking bar sights will be used. In such cases the Gun Captain will work the elevating gear, the Gun Layer giving "Elevate" or "Depress" as required.

NOTE.—The Gun Captain is responsible that the safety plug is in the proper hole in the safety plug box for the side from which the gun is to be fired.

For "ACTION," "UNDER COVER," "MISS-FIRE," "CEASE FIRING," "REPLACEMENT OF CASUALTIES," "DETACHMENT REAR" (see G.A.T., Vol. I, Section X).

The positions under cover are as follows:—

2, 4, and Gun Captain on the right of the gun.

3, 5, and Gun Layer on the left of the gun.

6, 7, 8, 9, in rear of the gun.

TO CEASE FIRING AND REPLACE STORES.

All stores are replaced by the numbers who brought them up, and the gun is left under metal by the Gun Layer; the detachment then falls in at "Detachment rear."

INSTRUCTIONS FOR USING THE LARGE CLINOMETER.

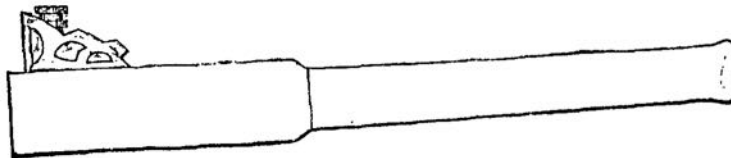
To read the angles marked on the drum.—The brass drum is marked in degrees, commencing at 0° on the top of 45° at the bottom. Each degree is subdivided into twelve parts; each small division, therefore, represents an angle of 5 minutes.

The scale is read from right to left, thus—

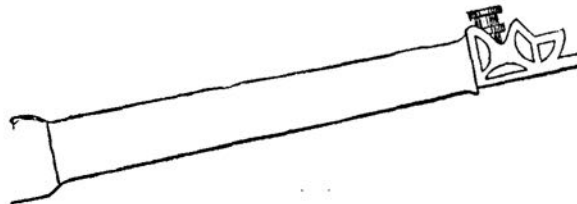


the reading opposite the arrow would indicate an angle of $2^\circ 25'$.

To lay a gun at any angle up to 45° .—Unscrew the drum until the \uparrow points to the elevation required. Place the clinometer thus—

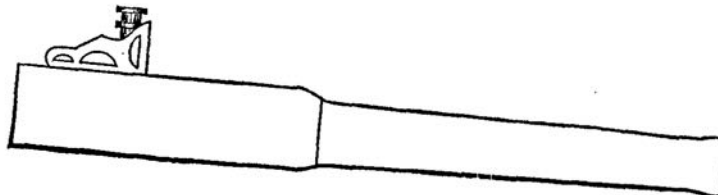


on the plane surface cut on the breech, or against the muzzle, thus—



and elevate the piece until the bubble of the spirit-level is in the centre of the tube.

For angles of depression.—Proceed as above, but reverse the direction of the instrument, placing it thus on the breech of the gun—



Preservation and adjustment of the instrument.—In order to preserve the clinometer in efficient working order, it is necessary to keep the working parts free from grit and dust as far as possible. As excess of oil is apt to cause the adhesion of grit, only sufficient is to be applied to make the screw work smoothly, and to keep the steel parts from rusting.

On no account should the instrument be taken to pieces, as it requires special tools to put it together again.

Instruments are issued in correct adjustment, and with due care will remain correct for many years.

To ascertain if the instrument is in adjustment.

- (a) Carefully clean the plane surface cut on a gun for use with the clinometer.
- (b) Turn the drum to zero.
- (c) Place the instrument on the plane surface (drum towards breech), and elevate or depress the gun till the bubble is in the centre of its run.
- (d) Turn the clinometer end for end.
- (e) Should the bubble not return to the centre, the instrument is out of adjustment.
- (f) As the amount of the error will generally be small it is advisable to add or subtract the error, as the case may be, rather than correct the adjustment.
- (g) To ascertain the error after complying with (d) (drum towards muzzle), turn the drum until the bubble is again in the centre of its run; *one-half* the reading on the drum is the index error.
- (h) If the reading falls on the *black* markings on the drum *add half* the amount when setting the clinometer for any required *elevation*.
- (i) If the reading falls on the *red* markings on the drum, *subtract half* for any required *elevation*.

If it is required to adjust the clinometer to have *no* index error, set the drum to the ascertained index error (keeping the drum end towards muzzle), and bring the bubble to the centre of its run by manipulating the capstan-headed nuts (using a tempered steel wire just fitting the holes in the nuts). Then placing the drum at zero, elevate or depress the gun till the bubble is in the centre.

Reversing the instrument end for end should not alter the central position of the bubble; should it do so, proceed as before until there is no change.

ALTERATIONS.

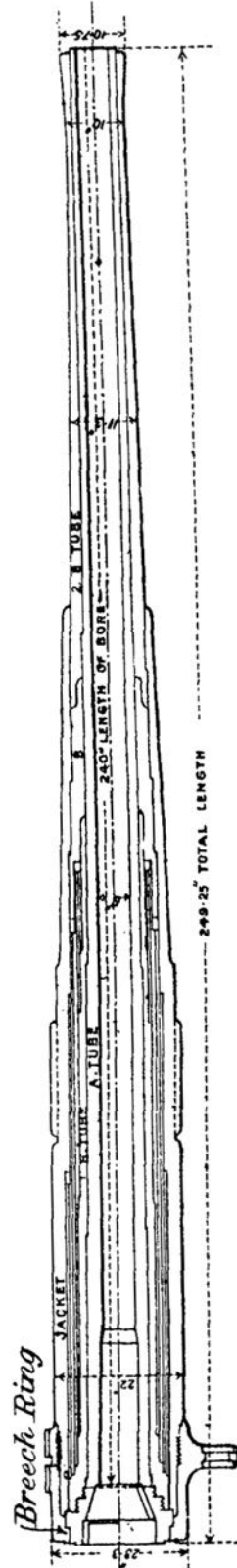
Para. of List of Changes.	Nature of Change.	Remarks.

PUBLIC LIBRARY OF VICTORIA

ORDNANCE, Q.F. 6 INCH. B, MARK II.

STEEL (WIRE CONSTRUCTION) 7 TON.

Scale $\frac{1}{32}$

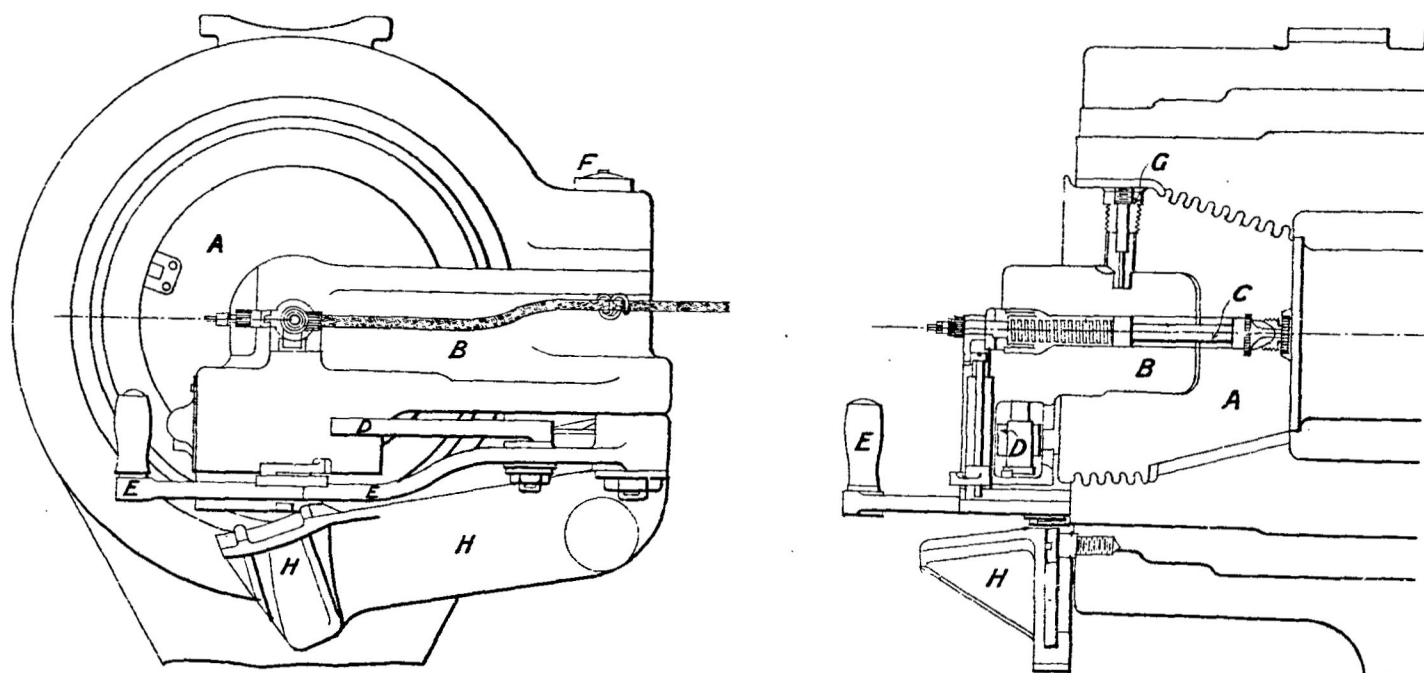


SECTION OF GROOVE
NO OF GROOVES 24
FULL SIZE.

- B Carrier.
 C Striker, Electric & Perc.
 D Link actuating Breech Screw.
 E Lever Breech Mechanism.
 F Hinge Bolt.
 G Screw fixing Breech Screw.
 H Shot Guide.
 I Electric Lead.

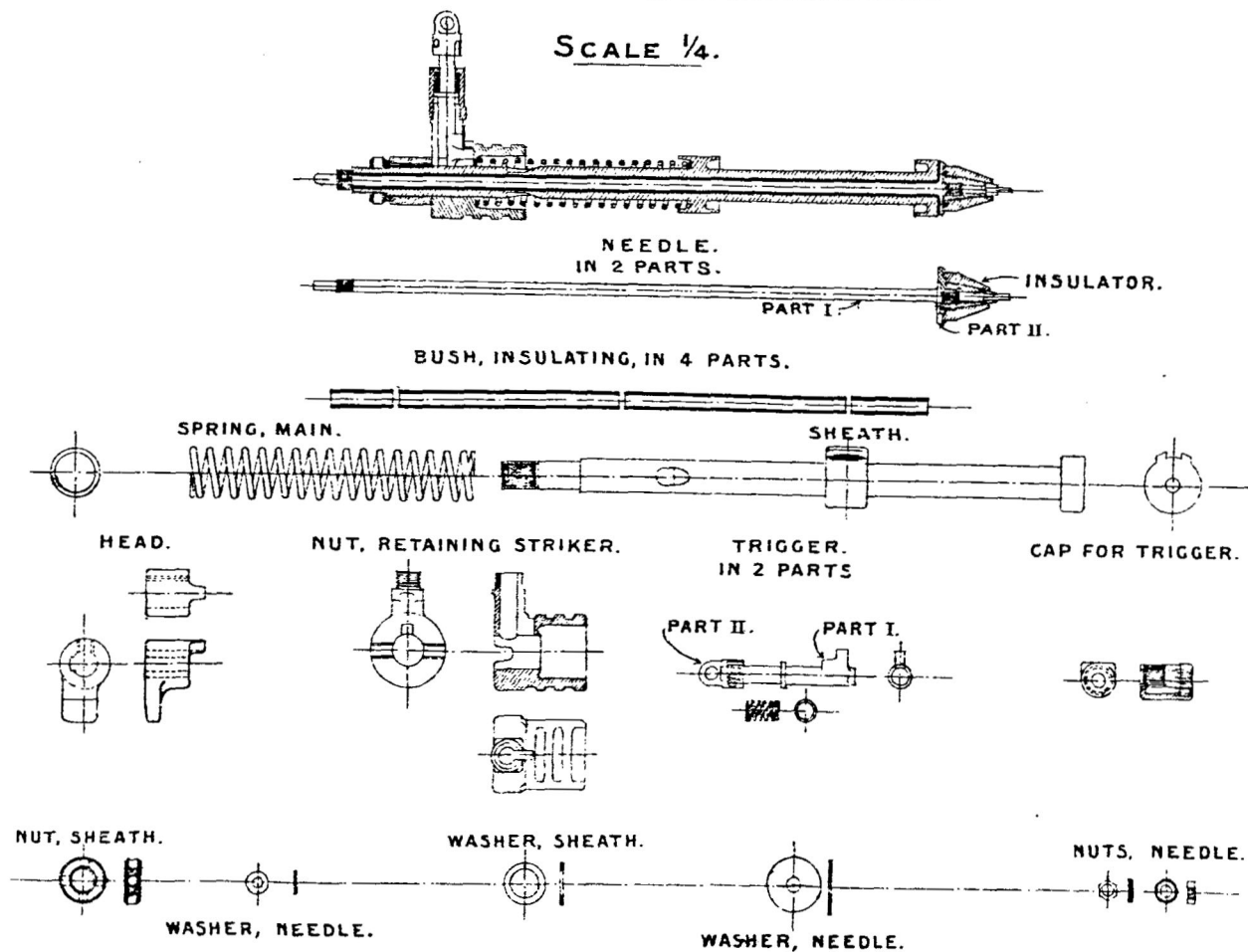
ORDNANCE, Q.F., 6 INCH, B. ARRANGEMENT OF BREECH MECHANISM.

SCALE $\frac{1}{8}$.



STRIKER, ELECTRIC & PERCUSSION.

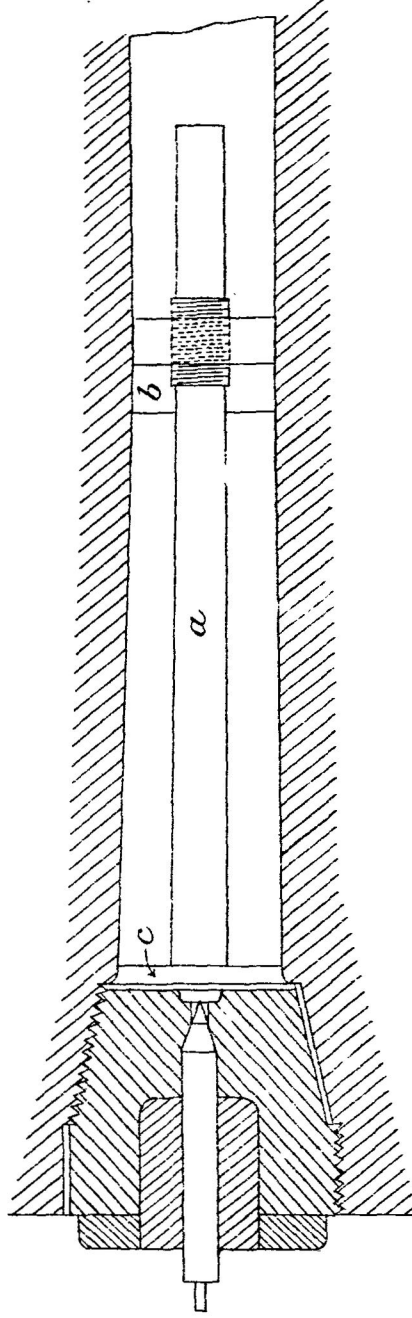
SCALE $\frac{1}{4}$.



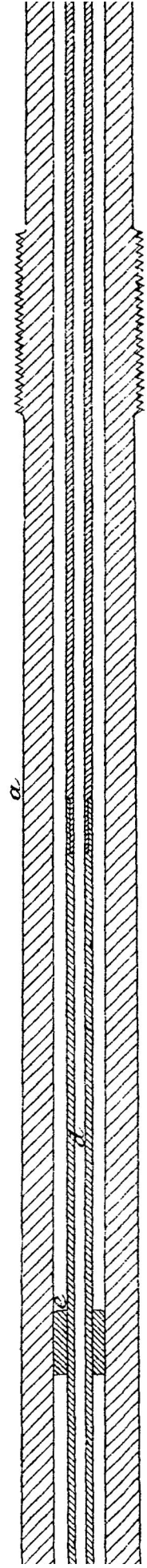
RIFLE, AIMING, 1 INCH, MORRIS, Q. F.

TYPICAL.

GENERAL ARRANGEMENT OF AIMING RIFLE IN GUN.



SECTION OF BARREL SHOWING TUBE IN POSITION.



CARRIAGE, GARRISON, Q.F. 6 INCH, MARK. I.

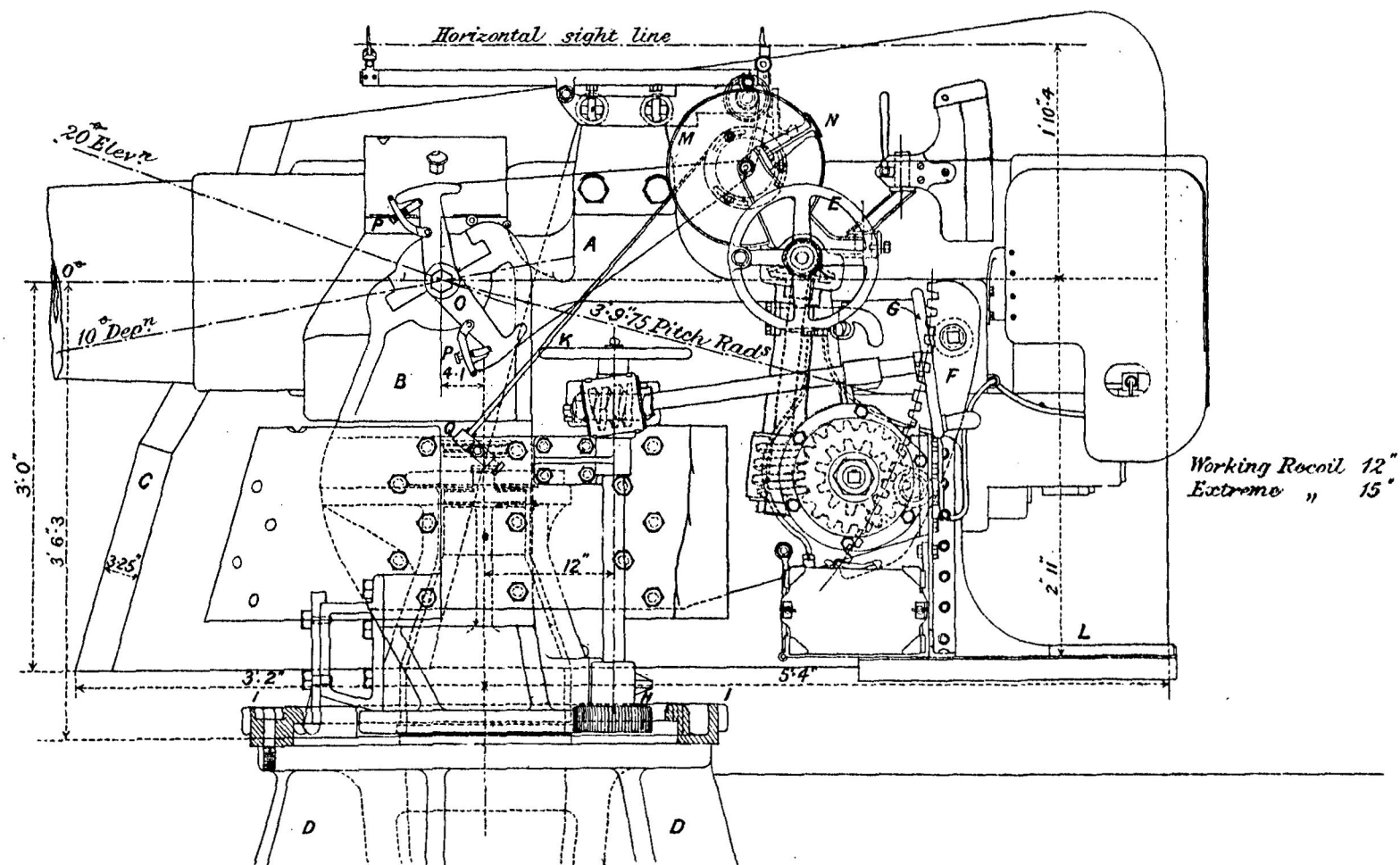
Scale $\frac{1}{16}^{\text{th}}$

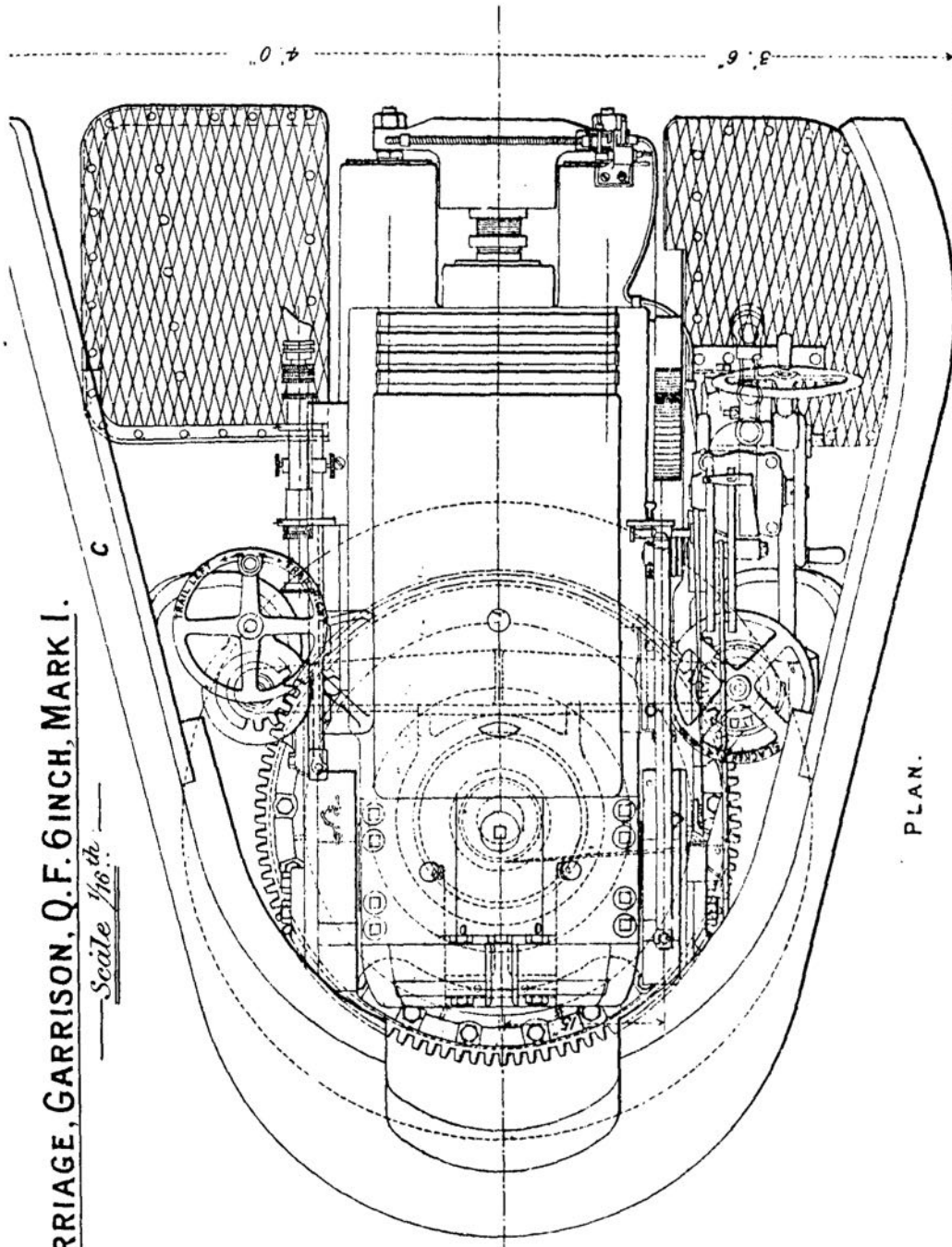
NOTE:-

This mounting is now fitted with
Auto sights see Plate VIII.

Rocking Bar Sights. see Plate IX.

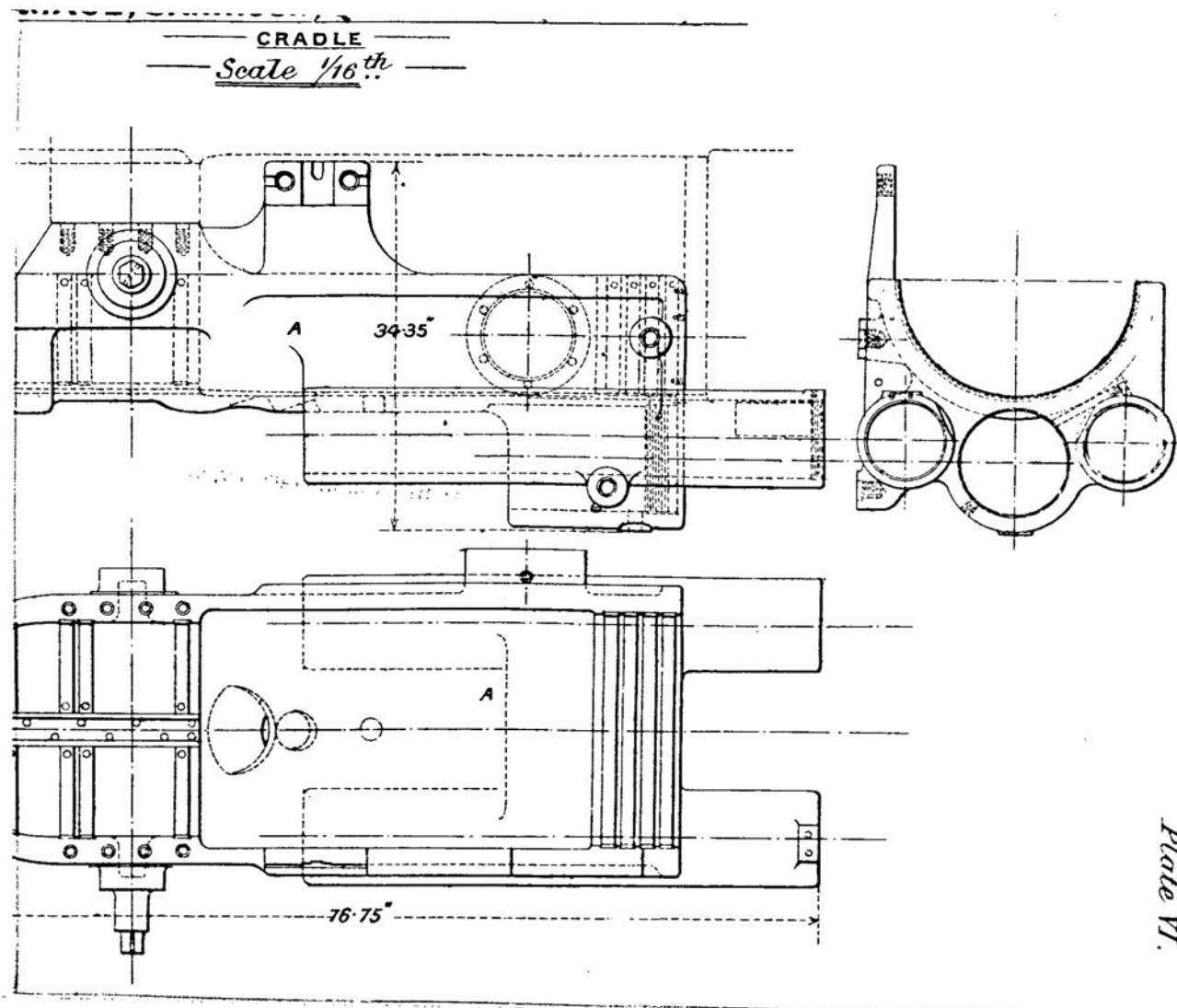
New Pattern Firing Gear.





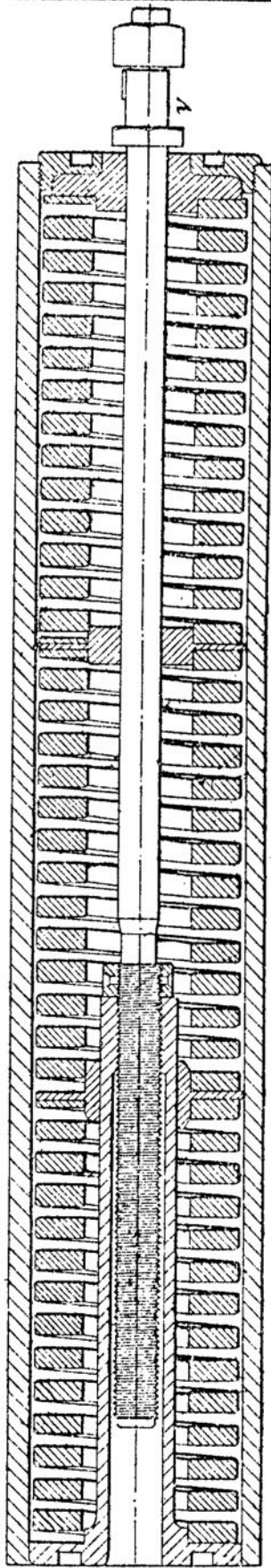
CARRIAGE, GARRISON, Q.F. 6 INCH, MARK I.

Scale $\frac{1}{16}$ in.

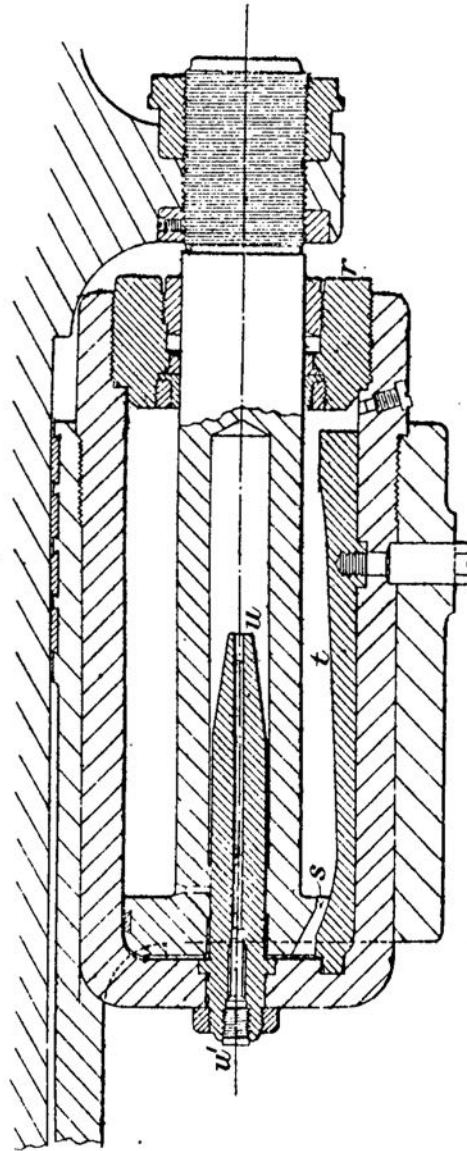


CARRIAGE, GARRISON, Q.F. 6 INCH, MARK I.

Scale $\frac{1}{16}$ "



SECTIONAL ELEVATION OF SPRING CASE

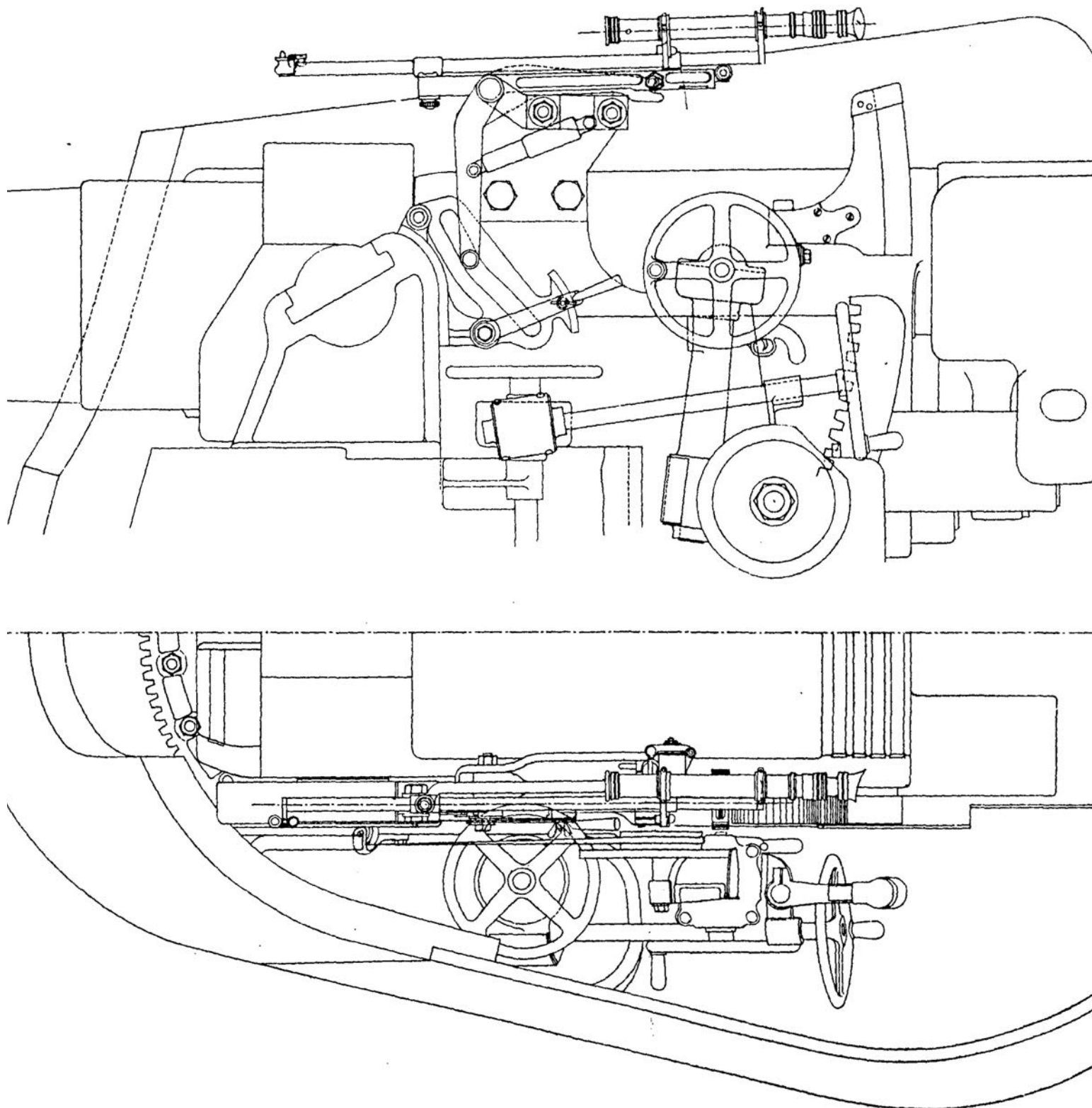


SECTIONAL ELEVATION OF BUFFER

CARRIAGE, GARRISON, Q.F., 6 INCH, MARK I. |L|.

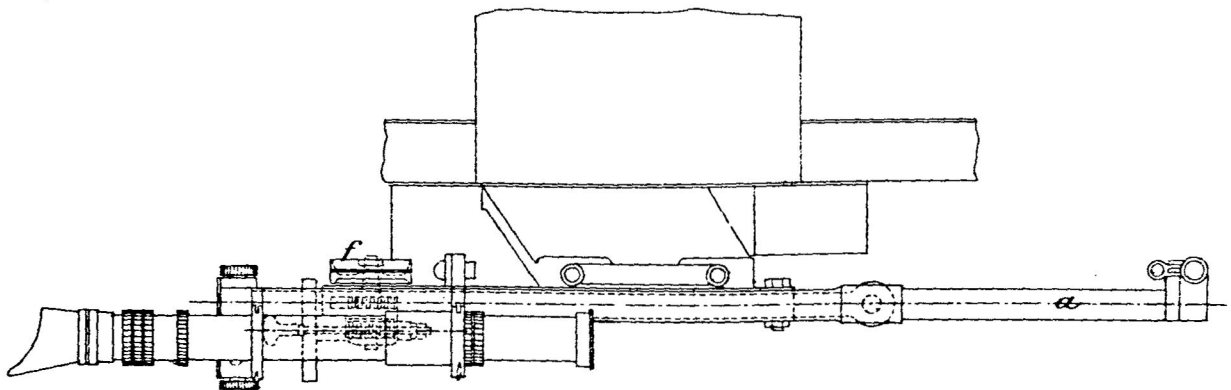
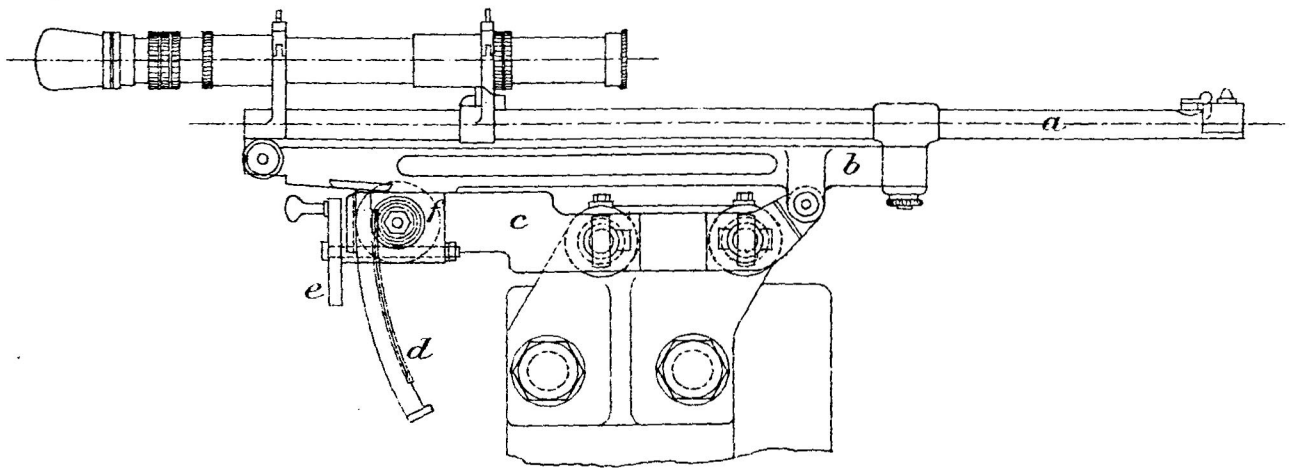
AUTOMATIC SIGHTS WITH TELESCOPE.

$\frac{1}{3}$ SCALE.



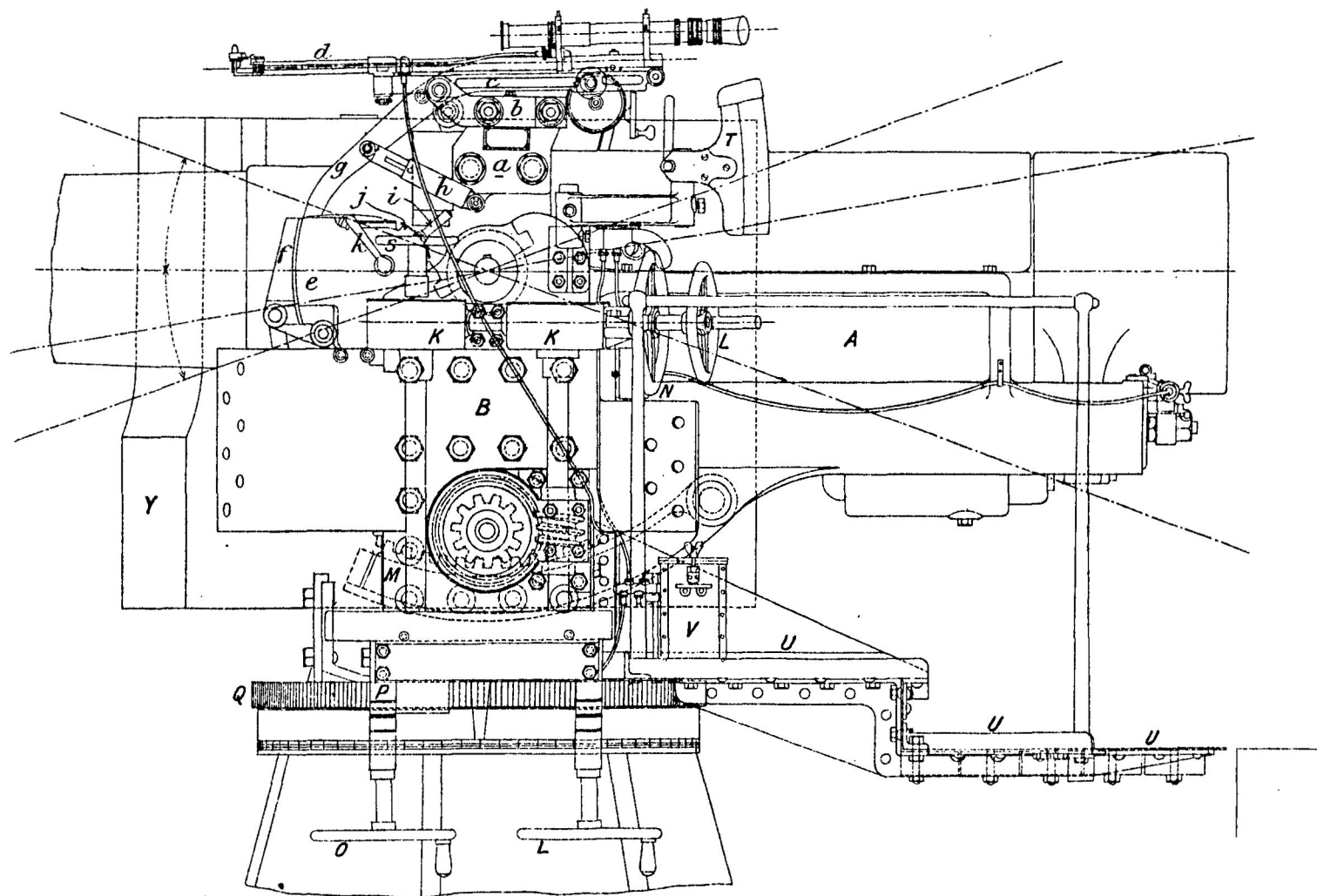
SIGHTS, ROCKING BAR. ^{Q.F.}_{B.L.} 6" C.P.

SCALE 1/8.



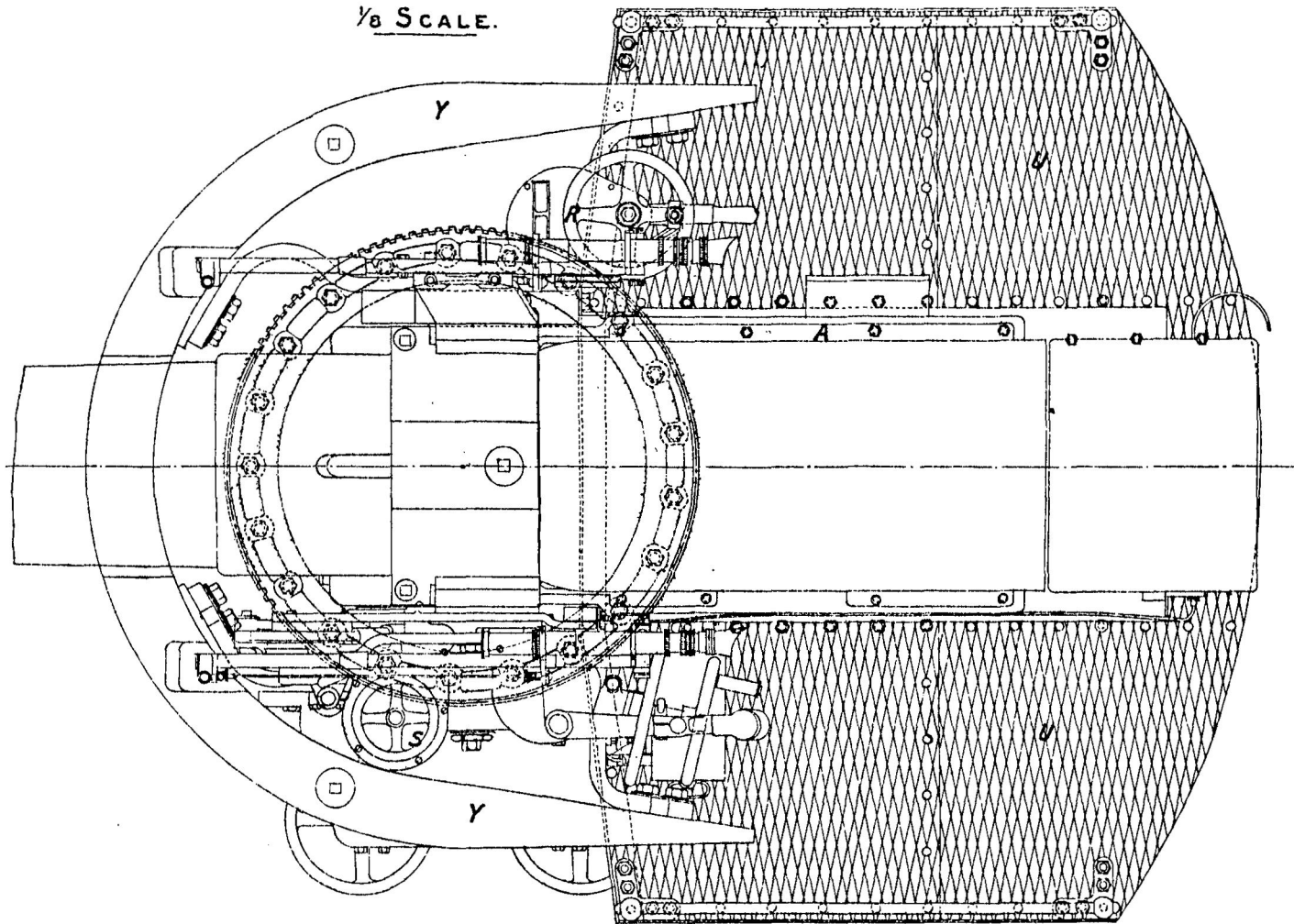
CARRIAGE, GARRISON. Q.F. 6 INCH, MARK II. | L |.

$\frac{1}{8}$ SCALE.

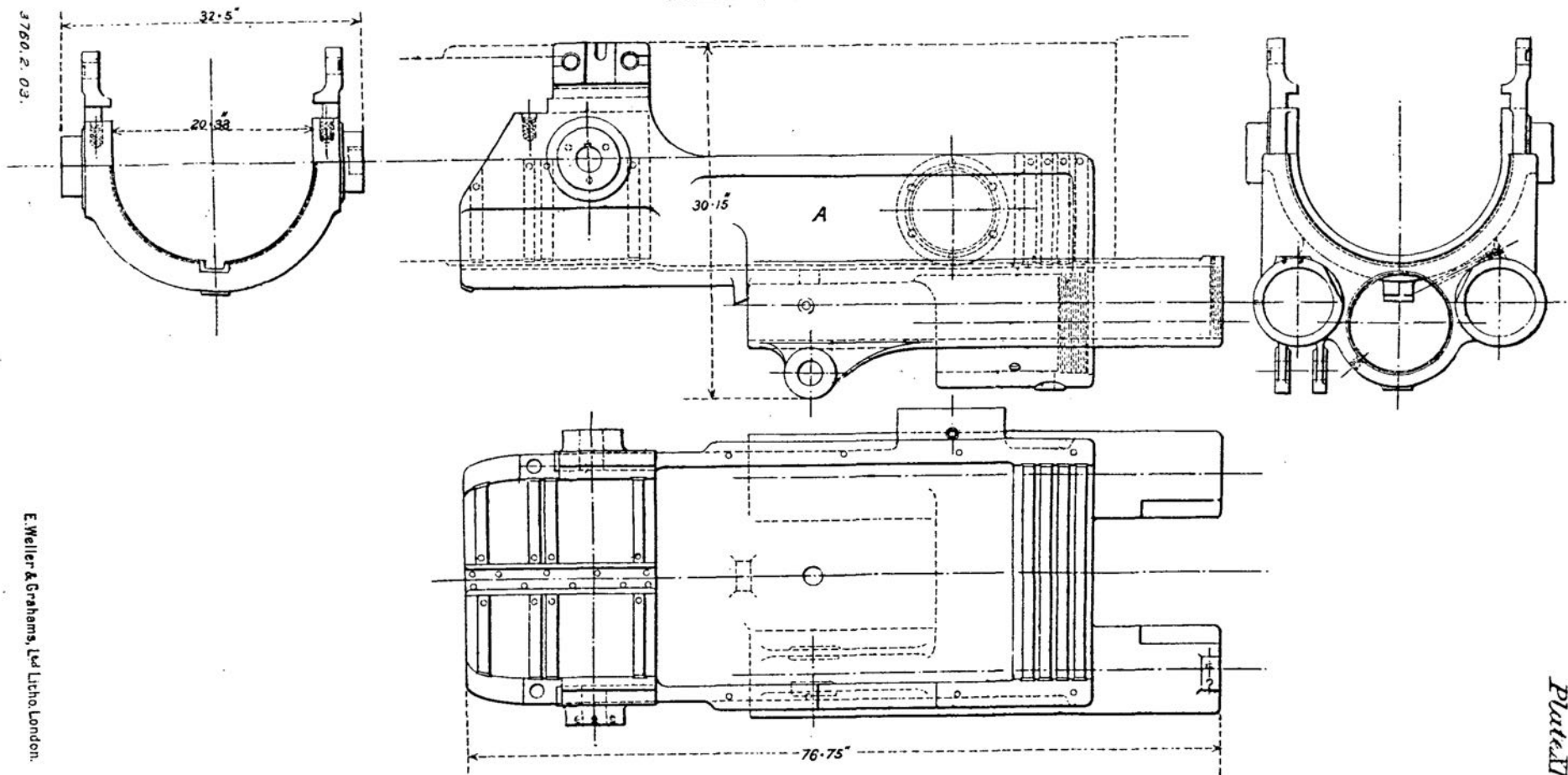


CARRIAGE, GARRISON, Q.F. 6 INCH, MARK II. |L|.

$\frac{1}{8}$ SCALE.



CARRIAGE, GARRISON, Q. F. 6 INCH
CRADLE
Scale $\frac{1}{16}^{\text{th}}$

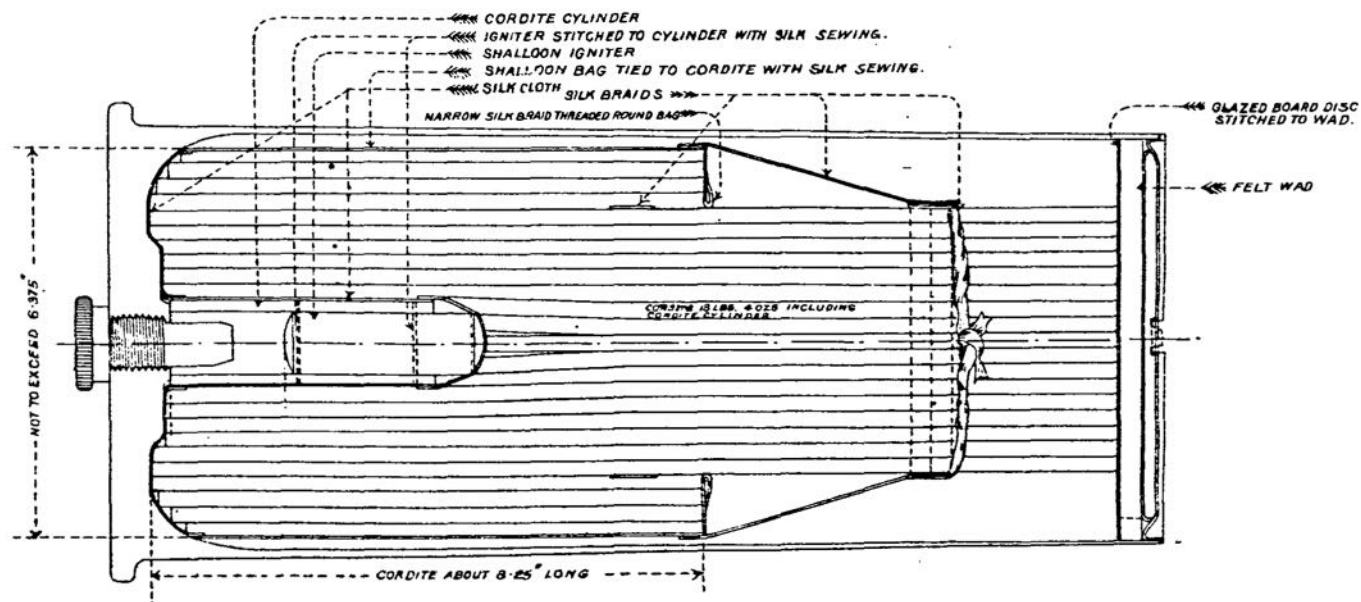


3760.2.03.

E. Weller & Grahams, Ltd Litho. London.

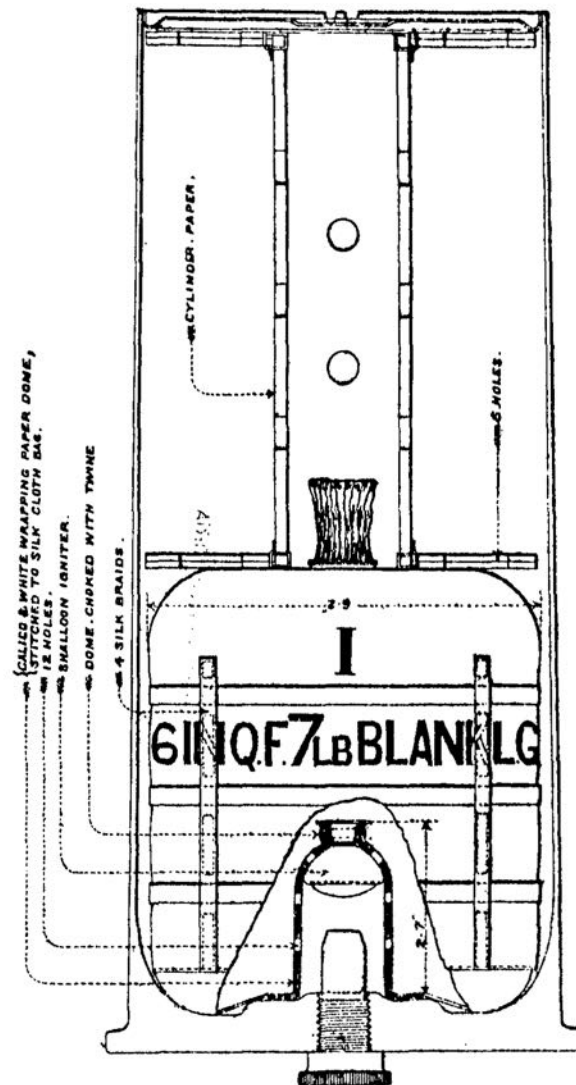
CARTRIDGE, Q. F. OR Q F C 6 INCH SHORT, FILLED 13 LB. 4 OZ, CORDITE SIZE 30, MARK VII.

SCALE $\frac{1}{3}$



METHOD OF FILLING: CARTRIDGE, Q.F. OR Q.F.C. BLANK, 6 INCH, MARK III | C |

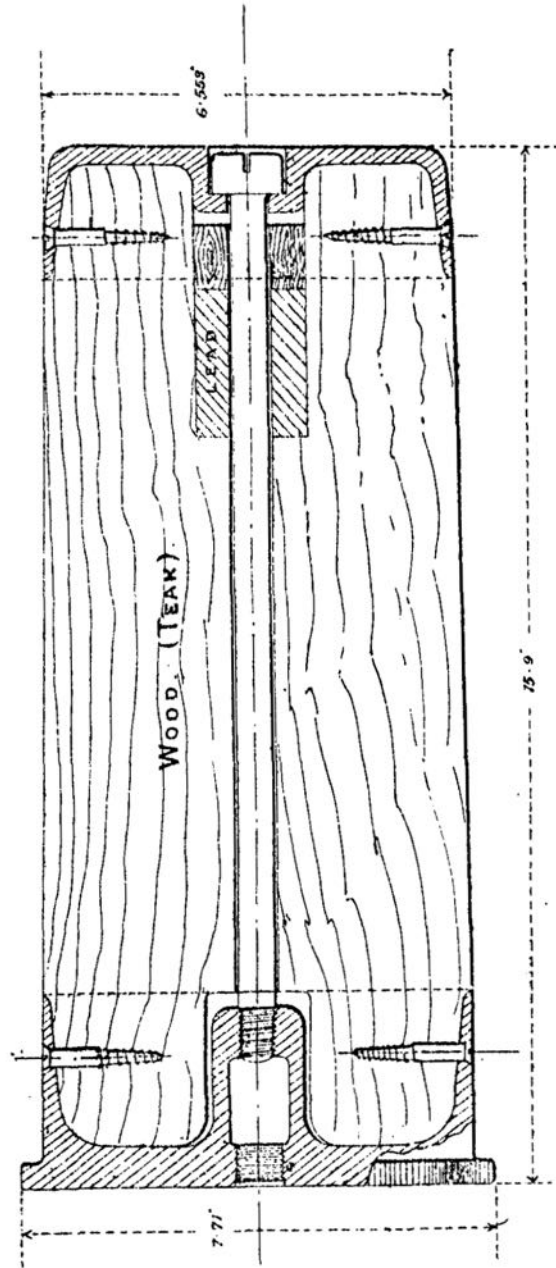
Scale $\frac{1}{8}$.



CARTRIDGE, Q.F. OR Q.F.C. DRILL, 6 INCH SHORT, MARK II* & III. C.

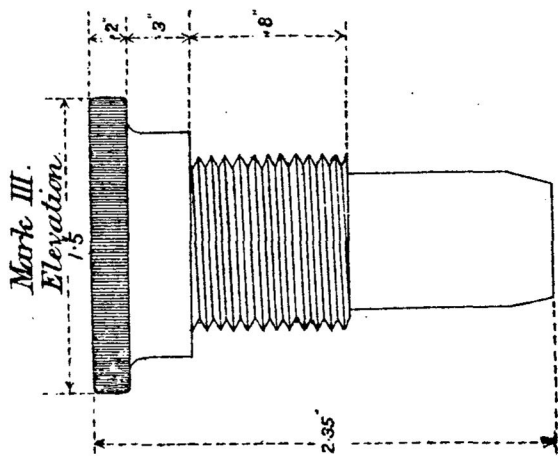
WOOD : WITH BRASS ENDS

Scale $\frac{1}{3}$

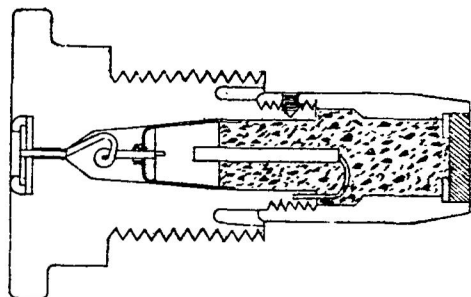


CARTRIDGE, Q. F. OR Q. F. C., PRIMER, ELECTRIC, LARGE.

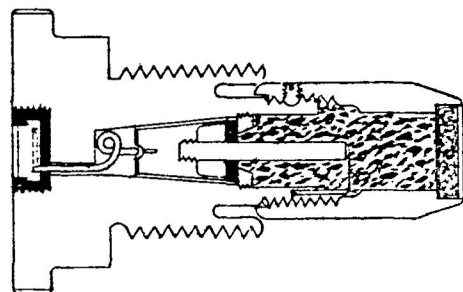
FULL SIZE.



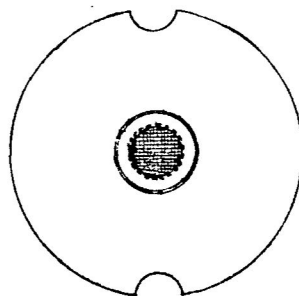
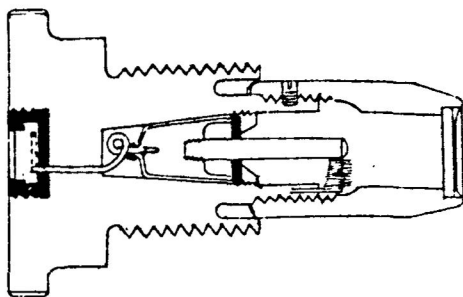
Mark III.
Section.



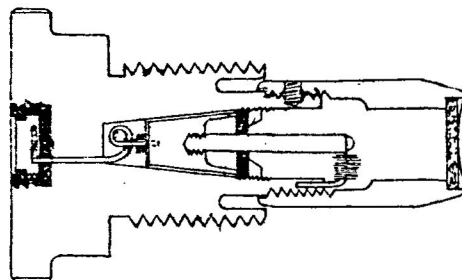
Mark IV.
Section.



Mark IV**
Section.



Mark V.
Section.

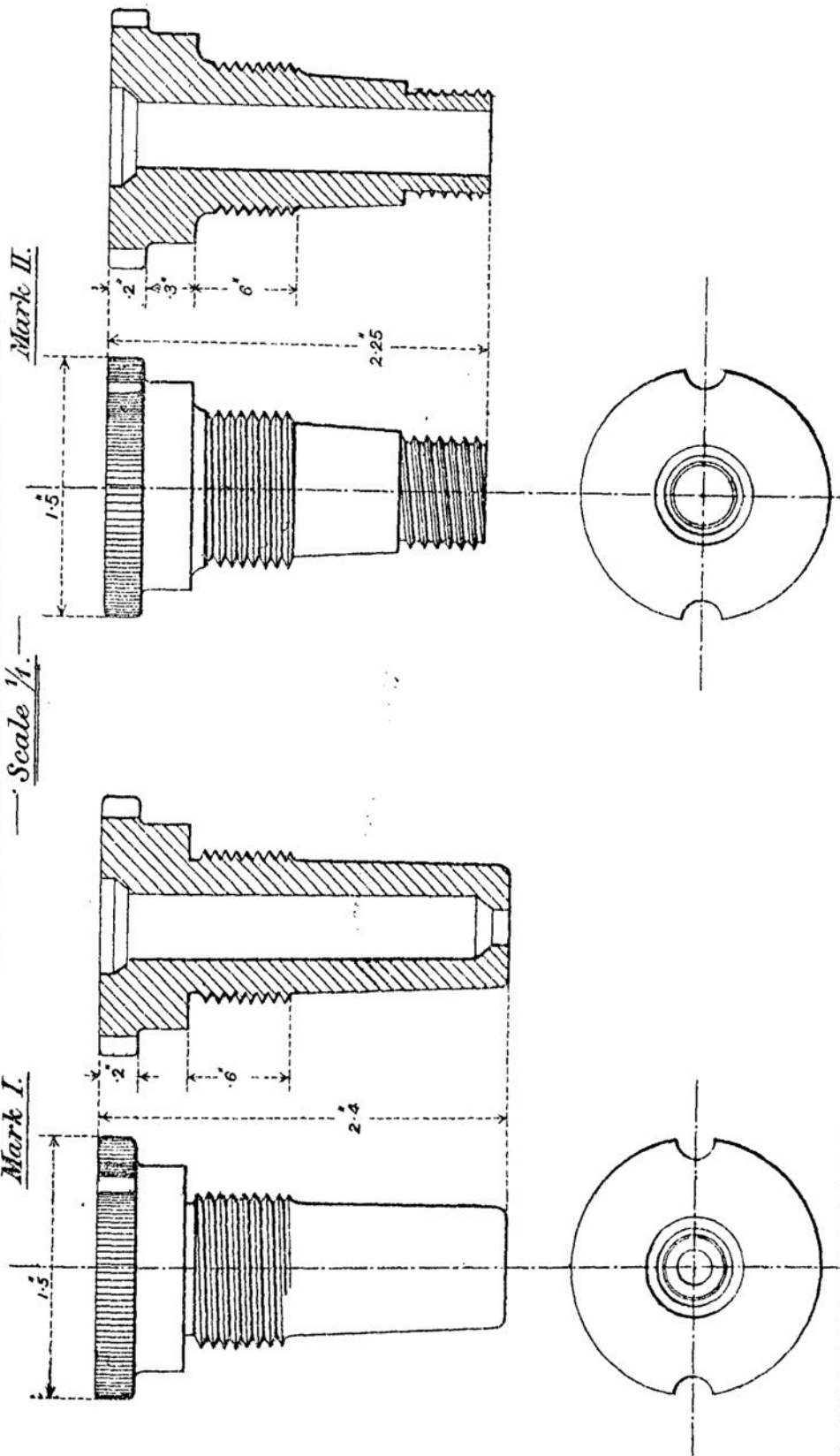


CARTRIDGE, Q. F., OR Q. F. C. ADAPTERS.

Mark I.

Scale $\frac{1}{4}$.

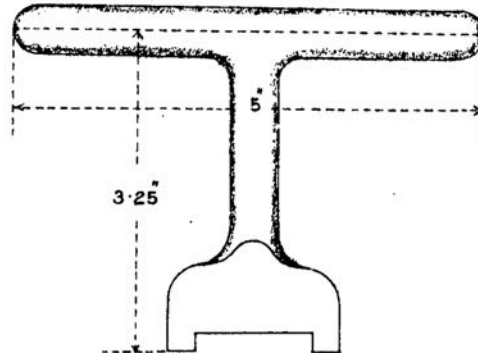
Mark II.



IMPLEMENTS. FUZE, SHELL. AND CARTRIDGE -
KEY, INSERTING, PRIMER, ELECTRIC, Q. F. OR Q. F. C, LARGE, MARK I

STEEL.

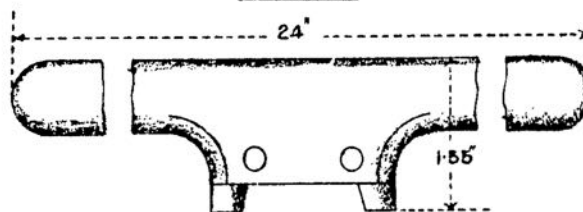
SCALE $\frac{1}{2}$



KEY, REMOVING, PRIMER ELECTRIC, Q. F. OR Q. F. C, LARGE, MARK II.

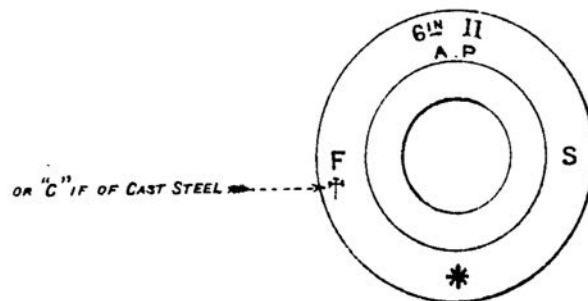
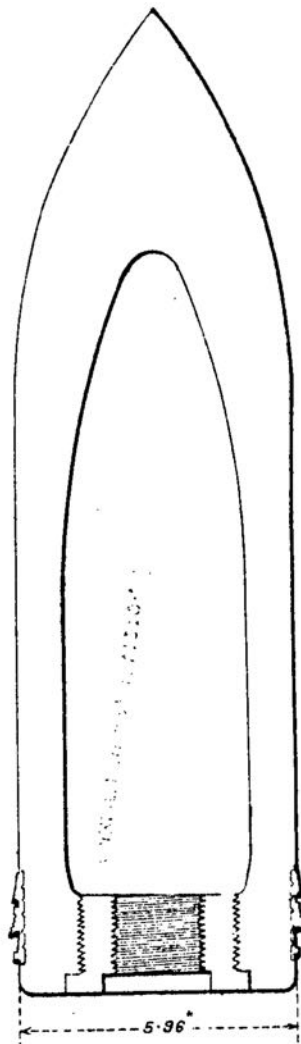
STEEL.

SCALE $\frac{1}{2}$



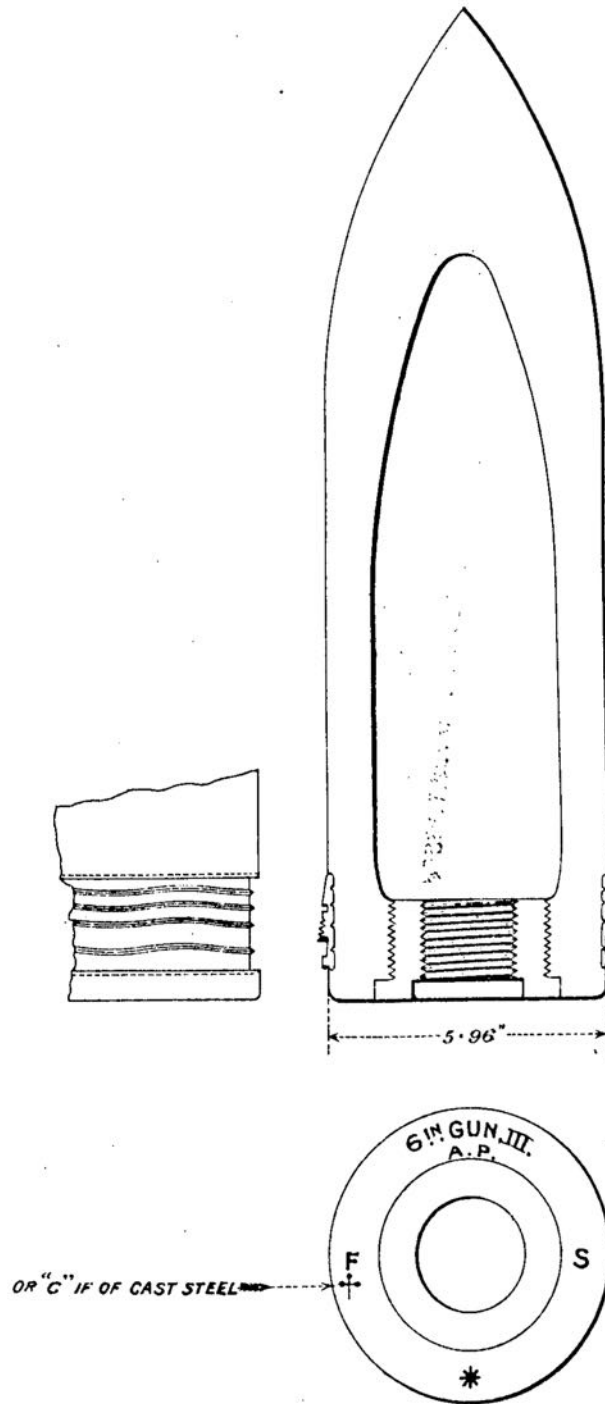
SHELL, B. L. Q. F. OR Q. F. C. ARMOUR PIERCING, 6 INCH GUN (MARK II)

Scale $\frac{1}{4}$.



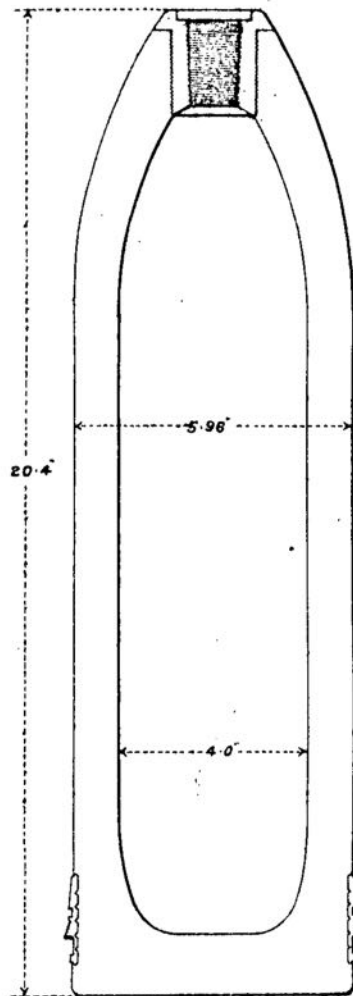
SHELL. B.L.Q.F. OR Q.F.C. ARMOUR PIERCING 6 INCH GUN (MARK III)

SCALE $\frac{1}{4}$.



SHELL, B.L.Q.F. OR Q.F.C., COMMON, LYDDITE, 6 INCH GUN, MARK III

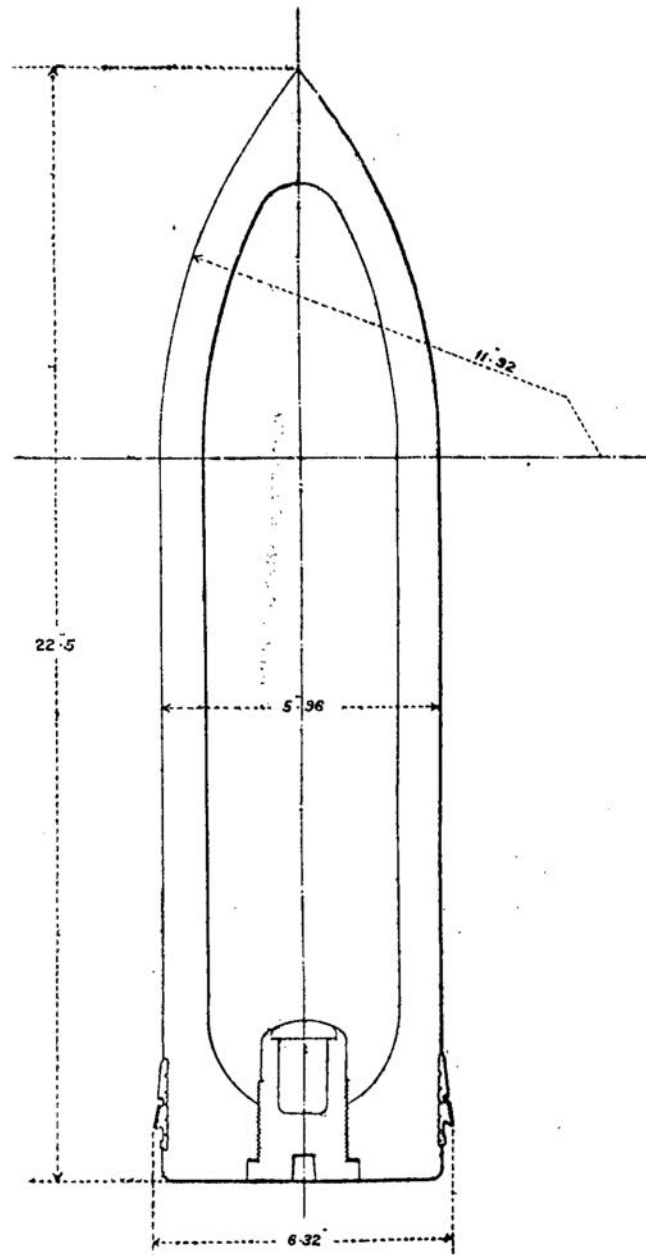
Scale $\frac{1}{4}$



SHELL, B.L.Q.F. OR Q.F. COMMON, POINTED, 6 INCH, GUN, MARK III.

CAST STEEL

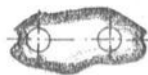
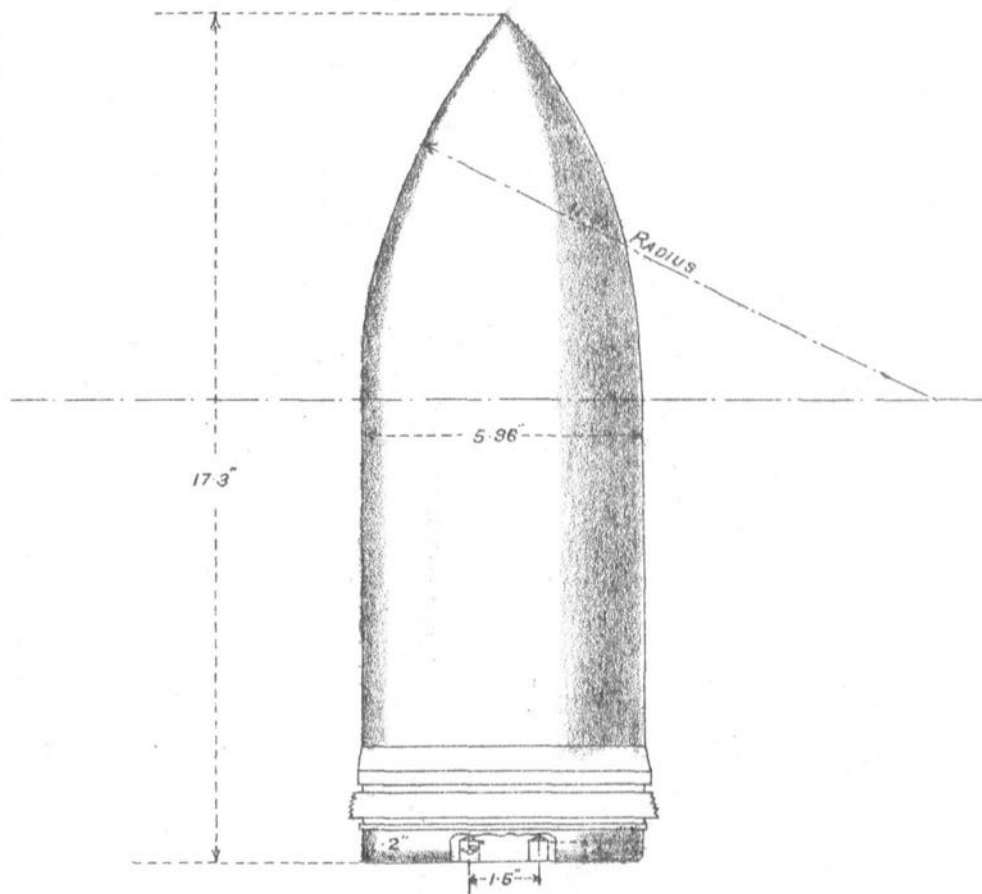
Scale $\frac{1}{4}$.



SHOT, B.L.Q.F. OR Q.F.C., ARMOUR PIERCING, 6 INCH. GUN, MARK III.

STEEL.

SCALE $\frac{1}{4}$

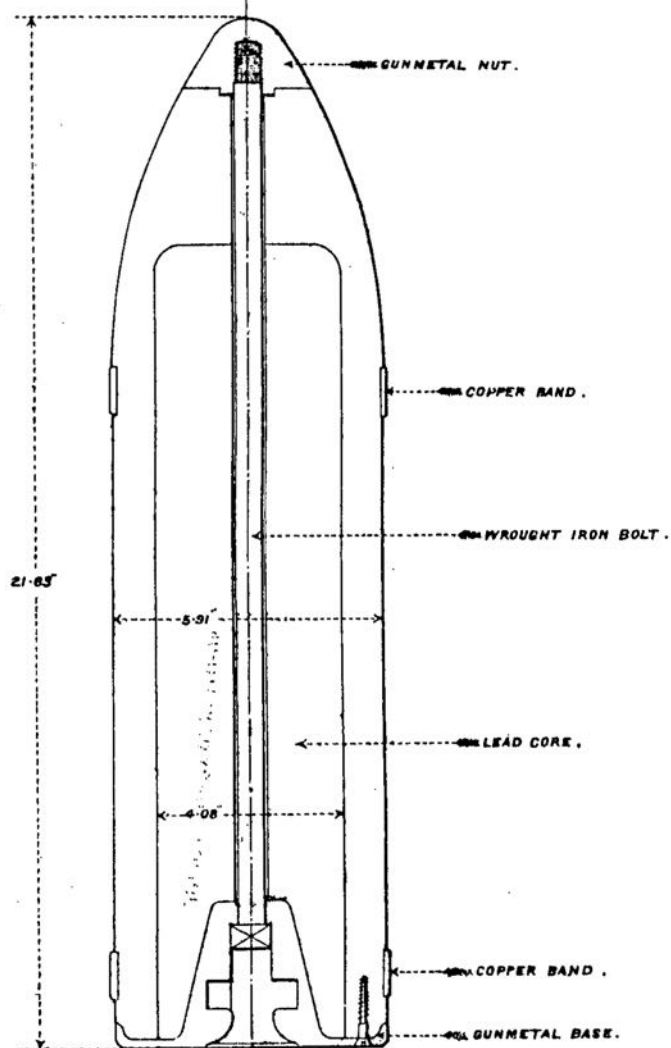


PART PLAN OF BASE.

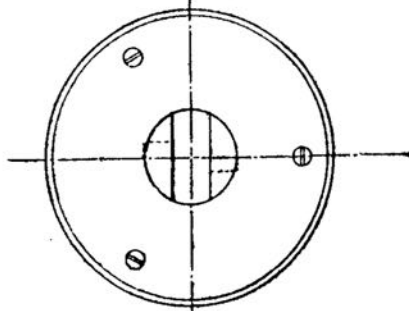
SHELL, Q.F. OR Q.F.C. 6 INCH, DRILL, (MARK II). C.

WOOD.

Scale $\frac{1}{4}$.



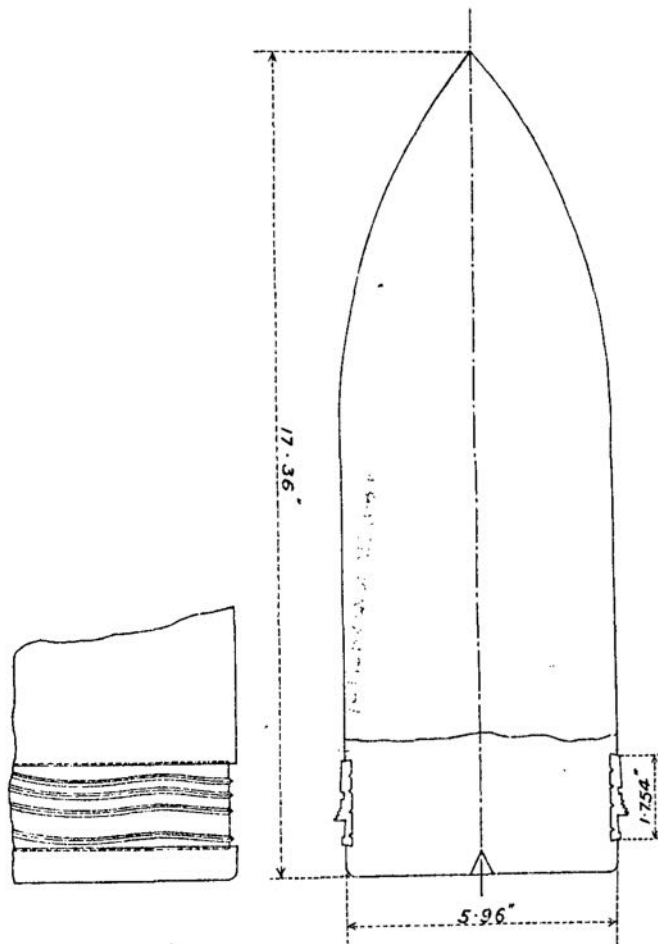
PLAN OF BASE.



SHOT, SOLID, B.L., Q.F. OR Q.F.C., 6 INCH GUN, MARK I. | C |.

IRON PRACTICE.

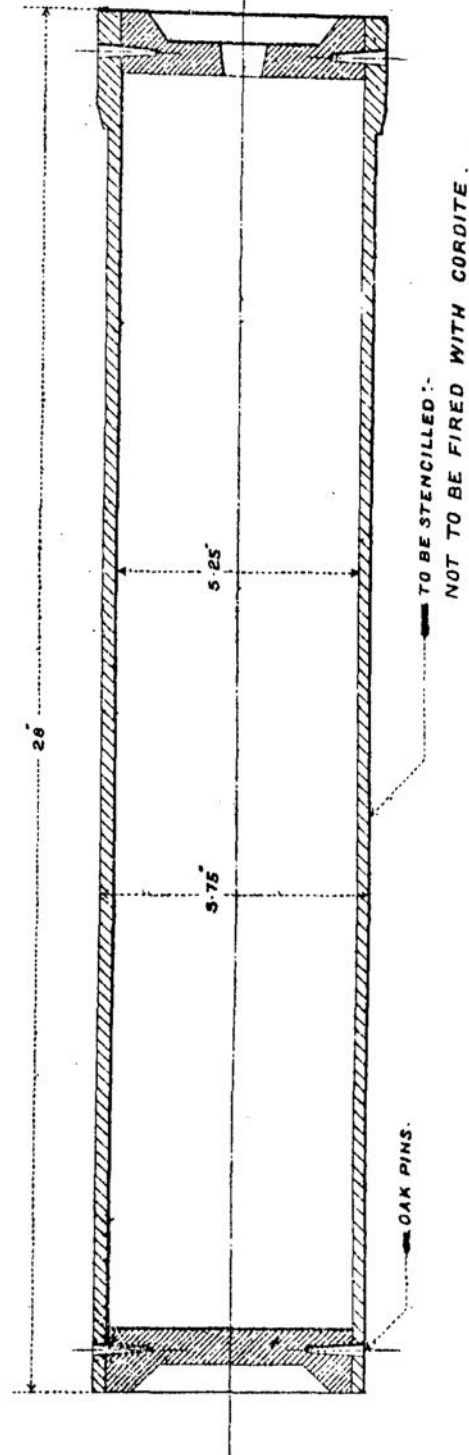
1/4 SCALE.



SHOT, PAPER, EMPTY, B.L. OR Q. F. 6 INCH, (MARK IV) L.

WITH BUNG, WEIGHT FILLED; 120 LB.

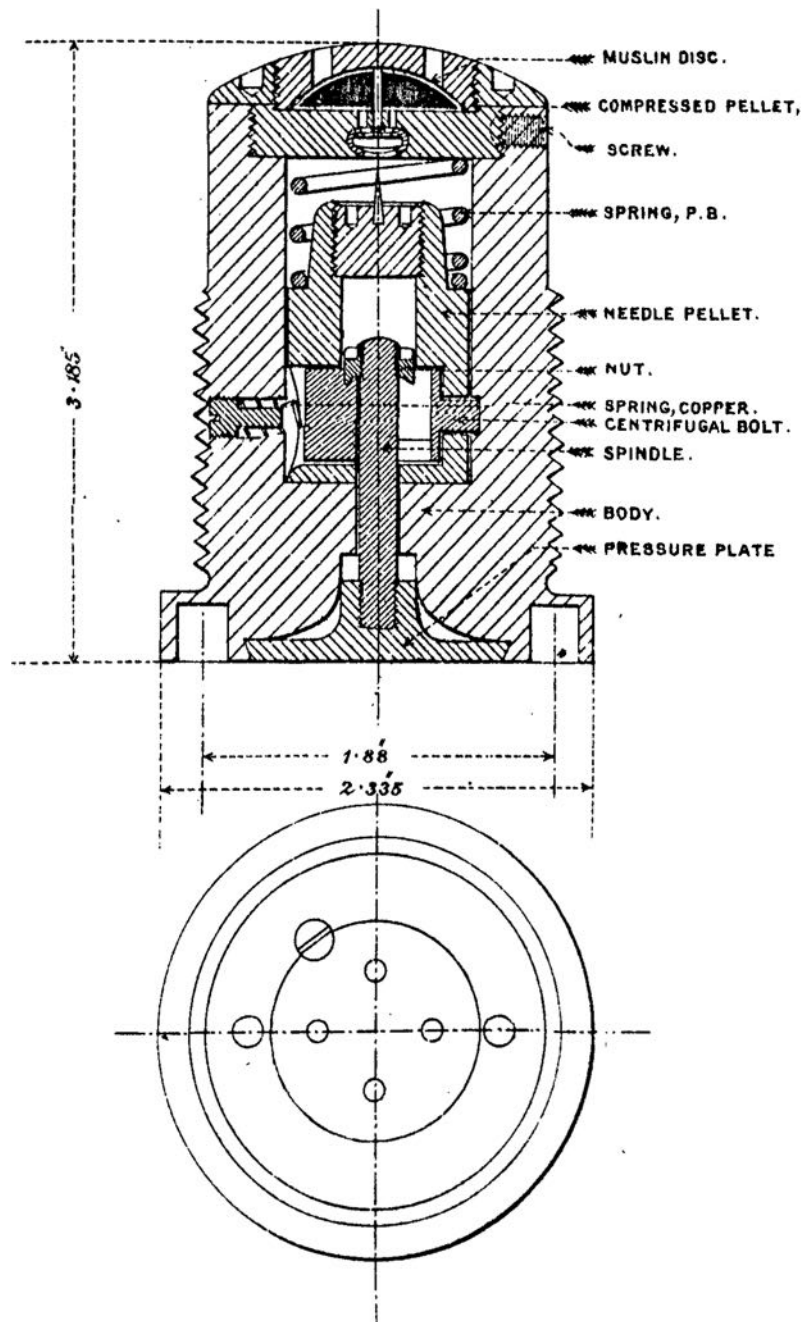
Scale $\frac{1}{4}$.



FUZE, PERCUSSION, BASE, LARGE, N^o II, MARK II.

METAL,

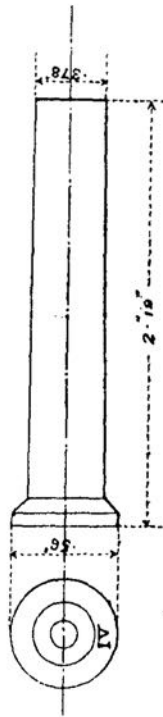
— FULL SIZE. —



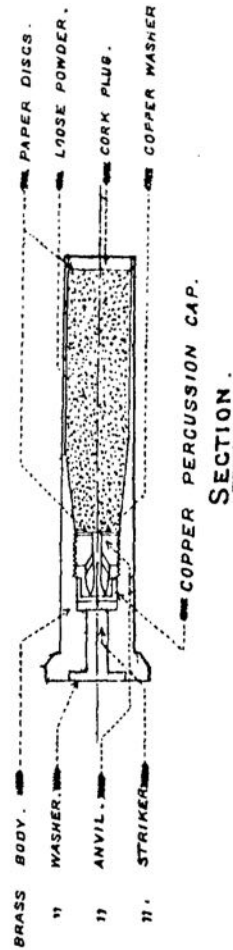
TUBE, VENT - SEALING, PERCUSSION, MARK IV.

BRASS.

FULL SIZE.



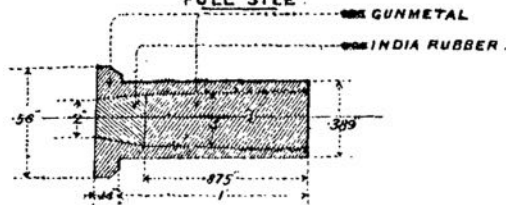
ELEVATION.



TUBE, VENT SEALING, PERCUSSION, DRILL MARK I.

SECTION.

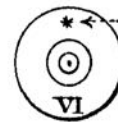
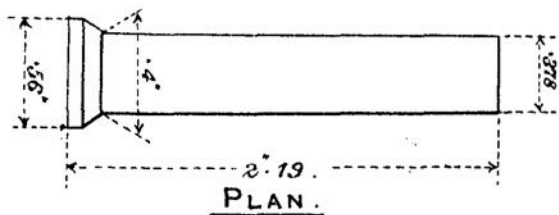
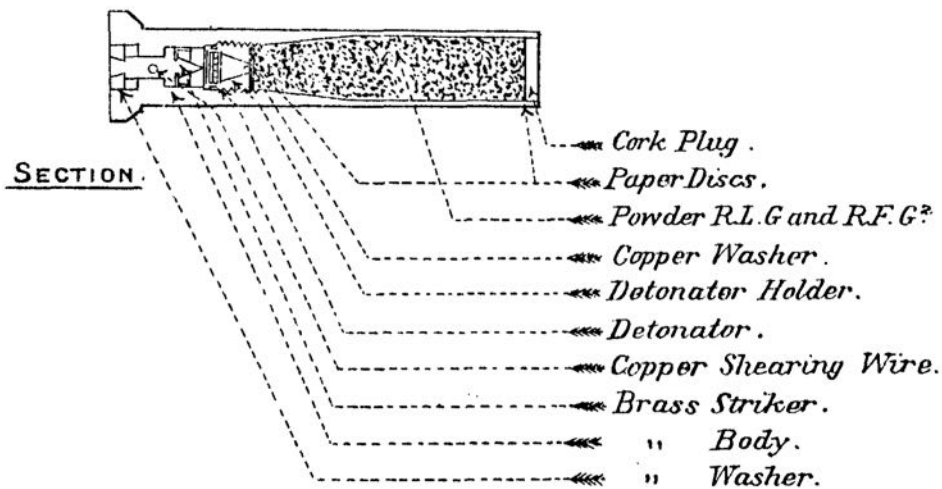
FULL SIZE.



TUBES, VENT SEALING PERCUSSION.

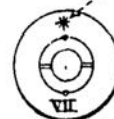
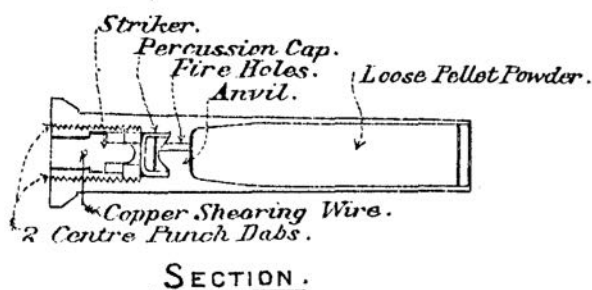
BRASS.
Full Size.

MARK VI.



MARK VII.

Contractor's Initials or
recognised Trade Mark.



END ELEVATION.